



BUILDINGS

BUILDING ENCLOSURE
ENGINEERING SERVICES

VERSION 2.0
PUBLISHED FEBRUARY 4, 2020



ENGINEERS &
GEOSCIENTISTS
BRITISH COLUMBIA

ENDORSED BY:



**ARCHITECTURAL
INSTITUTE OF
BRITISH COLUMBIA**

VERSION 2.0, FEBRUARY 4, 2020
©2020 ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA
ALL RIGHTS RESERVED.
COVER PHOTOGRAPH ©LAUGHINGMANGO/ISTOCK

PREFACE

These *Professional Practice Guidelines – Building Enclosure Engineering Services* were developed by Engineers and Geoscientists British Columbia (the Association) to guide professional practice related to Building Enclosure engineering services for buildings that fall under the *British Columbia Building Code*, the City of Vancouver Building By-Law, or the *National Building Code of Canada* (defined collectively in these guidelines as Building Code).

In particular, the practice of Building Enclosure engineering addressed in these guidelines includes the requirements for Building Enclosure engineering addressed in Parts 5, 9, and 10 (and Part 11; Vancouver Building By-law only) of the applicable Building Code, as well as Local Regulations.

These guidelines specifically set out the standards of practice that a Building Enclosure Engineer must generally follow and meet when providing Building Enclosure engineering services for building projects. Building Enclosure design expertise is shared with Architects, so these guidelines provide some guidance regarding this shared responsibility for various types of building projects.

In 1999, the Association’s Council adopted the first version of *Guidelines for Professional Practice – Building Envelope Professional Engineer*. Members of the Association’s Building Envelope Committee reviewed the 1999 document and other relevant documents, such as the Architectural Institute of British Columbia’s *Bulletin 34: Building Envelope Services – Appropriate Professional Practice*, which was endorsed by the Association, and produced the first version of *Guidelines for Professional Practice – Building Enclosure Engineering Services* in October 2012.

This current revision was undertaken to address minor errors, provide reference to quality management requirements, improve clarity in the guidance, and provide a focus on issues such as climate change and energy efficiency.

These guidelines outline the appropriate standard of practice to be followed at the time they were prepared. However, this is a living document that is to be revised and updated as required in the future, to reflect the developing state of practice.

PROFESSIONAL PRACTICE GUIDELINES
BUILDING ENCLOSURE ENGINEERING SERVICES

TABLE OF CONTENTS

PREFACE	i	2.2.10 Design or Field Review Only	11
ABBREVIATIONS	v	2.2.11 Multiple BEEs on One Project	11
DEFINED TERMS	vi	2.2.12 Specialty Consulting Services Provided by Others	12
VERSION HISTORY	x	2.2.13 Selection of Consultants	12
1.0 INTRODUCTION	1	2.2.14 Professional Liability Insurance	12
1.1 PURPOSE OF THESE GUIDELINES	1	2.2.15 Referral Fees	12
1.2 ROLE OF ENGINEERS AND GEOSCIENTISTS BC	2	3.0 GUIDELINES FOR PROFESSIONAL PRACTICE	13
1.3 INTRODUCTION OF TERMS	3	3.1 OVERVIEW	13
1.3.1 Defined Terms	3	3.2 SCOPE OF WORK	13
1.3.2 Accountability Documents	3	3.3 CONSTRUCTION PROJECT SERVICES	13
1.4 SCOPE OF THESE GUIDELINES	3	3.3.1 Conceptual or Schematic Design Phase	14
1.5 APPLICABILITY OF THESE GUIDELINES	3	3.3.2 Design Development Phase	14
1.6 ACKNOWLEDGEMENTS	3	3.3.3 Construction Documents Phase	15
2.0 ROLES AND RESPONSIBILITIES	5	3.3.4 Construction Procurement Phase	15
2.1 COMMON FORMS OF PROJECT ORGANIZATION	5	3.3.5 Construction Phase	15
2.2 RESPONSIBILITIES	5	3.3.6 Reporting	16
2.2.1 New Building Construction or Renovation Project	7	3.4 OTHER BUILDING ENCLOSURE SERVICES FOR CONSTRUCTION PROJECTS	17
2.2.2 Building Enclosure Rehabilitation or Renewal Project	7	3.4.1 Separation of Dissimilar Indoor Environments	17
2.2.3 Building Enclosure Repairs	9	3.4.2 Below-Grade Assemblies	17
2.2.4 Energy Use Assessment and Whole Building Energy Modelling	9	3.4.3 Secondary Structural Elements	17
2.2.5 Other Services	9	3.4.4 Snow and Ice Considerations	18
2.2.6 Supporting Registered Professional	9	3.4.5 Acoustic Design	18
2.2.7 Enhanced Building Envelope Services	10	3.4.6 Energy Use Assessment and Whole Building Energy Modelling	18
2.2.8 Accountability Documents for Part 9 Buildings	10	3.4.7 Heat Transfer	18
2.2.9 Reliance on Others	11	3.4.8 Reduction of Carbon Emission	19
		3.4.9 Vulnerability to Climate Change	19
		3.4.10 Commissioning	19
		3.4.11 Durability	20

3.5 OTHER SERVICES	20	4.1.6 Documented Field Reviews During Implementation or Construction	25
3.5.1 Building Enclosure Condition Assessments	20	4.1.7 Documented Independent Review of Structural Designs	25
3.5.2 Building Asset Management Planning	21		
3.5.3 Targeted Investigations	22	5.0 PROFESSIONAL REGISTRATION & EDUCATION, TRAINING, AND EXPERIENCE	26
3.5.4 Second Opinion Engagements	22	5.1 PROFESSIONAL REGISTRATION	26
3.5.5 Warranty Reviews	22	5.2 EDUCATION, TRAINING, AND EXPERIENCE	26
4.0 QUALITY MANAGEMENT IN PROFESSIONAL PRACTICE	23	5.2.1 Core Competencies	26
4.1 QUALITY MANAGEMENT REQUIREMENTS	23	5.2.2 Experience	28
4.1.1 Professional Practice Guidelines	23	5.2.3 Reference Materials	29
4.1.2 Use of Seal	23	6.0 REFERENCES AND RELATED DOCUMENTS	30
4.1.3 Direct Supervision	24	6.1 REFERENCES	30
4.1.4 Retention of Project Documentation	24	6.2 RELATED DOCUMENTS	33
4.1.5 Documented Checks of Engineering and Geoscience Work	24		

LIST OF TABLES

Table 1: List of Letters of Assurance and Other Accountability Documents Related to Building Enclosure Engineering Services.....	4
Table 2: Summary of the Functional Relationships for the Building Enclosure Portion of Typical Types of Projects.....	6

ABBREVIATIONS

ABBREVIATION	TERM
ACEC	Association of Consulting Engineering Companies Canada
ACEC-BC	Association of Consulting Engineering Companies British Columbia
AIBC	Architectural Institute of British Columbia
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BC	British Columbia
<i>BCBC</i>	<i>British Columbia Building Code</i>
BEE	Building Enclosure Engineer
CRP	Coordinating Registered Professional
<i>NBC</i>	<i>National Building Code of Canada</i>
RP	Registered Professional
RPR	Registered Professional of Record
SRP	Supporting Registered Professional
VBBL	Vancouver Building By-law

DEFINED TERMS

The following definitions are specific to these guidelines. These defined words and terms are capitalized within the text of the guidelines. If the definition is based on the *British Columbia Building Code (BCBC)*, then this is indicated within the definition. Explanatory notes regarding the specific application of the definition for the purpose of these guidelines may also be provided.

TERM	DEFINITION
Act	<i>Engineers and Geoscientists Act</i> [RSBC 1996], Chapter 116.
Architect	An individual who is registered or licensed by the Architectural Institute of British Columbia under the <i>Architects Act</i> [RSBC 1996], Chapter 17 to practice the profession of architecture and provide architectural services in British Columbia.
Architects Act	<i>Architects Act</i> [RSBC 1996], Chapter 17.
Association	The Association of Professional Engineers and Geoscientists of the Province of British Columbia, also operating as Engineers and Geoscientists BC.
Authority Having Jurisdiction	The jurisdictional body (usually municipal) with the authority to administer and enforce the Building Code or a local building bylaw or code, or the official or agency designated by that body to exercise such a function.
BC Energy Step Code	Progressive performance targets, or “steps,” for new buildings, incorporated into the <i>BCBC</i> , used by local authorities to encourage or require the construction of more energy-efficient buildings. All steps require Building Energy Modelling.
Building Code	Includes the <i>British Columbia Building Code</i> , the City of Vancouver Building By-law, and the <i>National Building Code of Canada</i> .
Building Enclosure	Includes materials, components, and assemblies, as defined in Article 5.1.2.1 of the Building Code; Building Enclosure is synonymous with the term “building envelope” and can be used interchangeably with that term.
Building Enclosure Engineer	An Engineering Professional with a concentrated practice in the area of Building Enclosure engineering and who is qualified, in accordance with the guidance provided in these guidelines, to engage in such practice.
Building Energy Modelling	The use of computer software to estimate the energy use of a building over a period of time under a certain set of conditions, which is sometimes referred to as building performance simulation.
Bylaws	The Bylaws of the Association made under the <i>Act</i> .
Client	The party who enters into a contract with a Building Enclosure Engineer for the provision of Building Enclosure engineering services.
Construction Documents	Documents for a building project, including all the plans and supporting documents, such as engineering and architectural Design Drawings and Specifications.

TERM	DEFINITION
Constructor(s)	The contractor(s), subcontractor(s), and trade contractor(s) responsible for the construction of a building.
Coordinating Registered Professional	Defined in the <i>BCBC</i> as a Registered Professional retained to coordinate all design work and Field Reviews of the Registered Professionals who are required for a project.
Design Drawings	Drawings (except Record Drawings; see below), including supplemental sketches or drawings, prepared by a Registered Professional at any stage of a building project. Design Drawings, including those submitted for building permitting, or other purposes, must be signed, sealed, and dated by the Registered Professional of Record who assumes overall responsibility for the particular aspect of the design that he or she prepared.
Direct Supervision	The act of taking responsibility for the control and conduct of the engineering work of a subordinate, who could be an Engineer-in-Training (EIT), a person not registered or licensed to practice professional engineering, or another Engineering Professional.
Engineering Professional(s)	Professional engineers and licensees who are registered or licensed by the Association and entitled under the <i>Act</i> to engage in the practice of professional engineering in British Columbia.
Engineers and Geoscientists BC	The business name for the Association.
Enhanced Building Envelope Services	Refers to services provided by a Building Enclosure Engineer, and mandated by an Authority Having Jurisdiction, to address Building Enclosure performance issues in accordance with the requirements of Sections 5.4, 5.5, and 5.6 in Part 5 of Division B of the Building Code. Enhanced Building Envelope Services must be provided in a manner consistent with <i>Bulletin 34: Building Envelope Services – Appropriate Professional Practice</i> (AIBC and Engineers and Geoscientists BC 2011).
Field Review(s)	The reviews conducted at the site of the implementation or construction of an engineering work by an Engineering Professional or by his or her subordinate acting under his or her direct supervision, for the purpose of ascertaining whether the implementation or construction of the work substantially complies in all material respects with the engineering concepts or intent reflected in the engineering documents prepared for the work. Defined in the <i>BCBC</i> as follows: “Field Review means a review of the work (a) at a building site, and (b) where applicable, at locations where building components are fabricated for use at the building site that a Registered Professional in his or her professional discretion considers necessary to ascertain whether the work substantially complies in all material respects with the plans and supporting documents prepared by a Registered Professional.”
Letters of Assurance	Uniform, mandatory documents that are intended to clearly identify the responsibilities of key individuals in a building project, and which are executed in accordance with Subsection 2.2.7. in Part 2 of Division C of the <i>BCBC</i> and the City of Vancouver Building By-law, otherwise known as Schedules A, B, C-A, and C-B.
Local Regulations	Local building bylaws or other regulations applicable to the Authority Having Jurisdiction.

TERM	DEFINITION
Maintenance	The actions taken periodically to sustain a desired or required level of performance; Maintenance includes cleaning, minor Repairs, replacement of smaller components, and activities that limit the deleterious effects to the Building Enclosure.
Model Schedules D and C-D	Alternate accountability documents in the form provided in <i>Bulletin 34: Building Envelope Services – Appropriate Professional Practice</i> (AIBC and Engineers and Geoscientists BC 2011), which are not Letters of Assurance under the <i>BCBC</i> , but are used when Enhanced Building Envelope Services are performed.
Owner	Any individual, firm, or corporation controlling the property under consideration during the period of application of the Building Code. The Owner when a building is being designed and constructed (e.g., the developer) is often different from the Owner after the building construction is complete and the property is being used for its intended purpose (e.g., a strata corporation).
Primary Structural System	The combination of elements that support the building’s self-weight and the applicable live loads based on occupancy, use of the space, and environmental loads such as wind, snow, and seismic forces.
Record Drawings	Drawings prepared to record what was constructed. The types of information provided vary, but can include measurements, elevations, sizes, or notes added to the Construction Documents. They are typically prepared by the Architect based on the as-built drawings prepared by the Constructor.
Registered Professional	Defined in the <i>BCBC</i> as: “(a) a person who is registered or licensed to practise as an architect under the <i>Architects Act</i> , or (b) a person who is registered or licensed to practise as a professional engineer under the <i>Engineers and Geoscientists Act</i> .” For the purposes of the <i>Engineers and Geoscientists Act</i> , this can include professional engineers and licensees having the appropriate scope of practice, all of whom must be qualified by training or experience to provide designs for building projects.
Registered Professional of Record	Defined in the <i>BCBC</i> as a Registered Professional retained to undertake design work and Field Reviews in accordance with Subsection 2.2.7. of Division C.
Rehabilitation	The process of undertaking a program of comprehensive and systemic reconstruction of the Building Enclosure assemblies and details, so that it can fulfill its originally intended functions. Rehabilitation projects are most often initiated because of premature failure.
Renewal	The process of undertaking a program of systemic reconstruction or replacement of aged elements of the Building Enclosure. Renewal projects are very similar in scope to Rehabilitation projects but are not associated with premature failure; rather, the work is needed due to normal wear and aging associated with an element reaching the end of its Service Life.
Renovation	The process of undertaking improvements or changes to the Building Enclosure as a part of a more general program for the building related to changes in functional, performance, or occupancy requirements rather than premature failure or the need for Renewal.

TERM	DEFINITION
Repair	The process of undertaking the reconstruction or replacement of specific elements of the Building Enclosure so that it can fulfill its originally intended functions. Unlike Rehabilitation, a Repair is undertaken because of a premature failure but is non-systemic and, therefore, focused on one specific aspect of the construction, or is localized to one area of a building.
Secondary Structural Element	A structural design element that is structurally significant for the function it serves but does not contribute to the overall strength or stability of the Primary Structural System. Examples can include fastening and strength of curtain wall systems; frames of other types of glazed assemblies; steel stud infill panels; various claddings; roof anchors; guardrails; most sheathing within wall assemblies; and seismic restraints for architectural, mechanical, and electrical design elements.
Service Life/Service Lives	The actual period of time that any element performs its intended function(s) without Rehabilitation, Renewal, or Repair associated with premature failure, but with periodic Maintenance.
Specifications	A written description of the materials, standards of quality, minimum performance requirements, and construction requirements for design elements of a building project.
Submittal(s)	Items required by contract or otherwise by the Construction Documents to be submitted by the Constructor to the Coordinating Registered Professional, such as requests for payment, progress reports, shop drawings, materials samples, manufacturer's literature, concrete mix designs, aggregate gradation reports, and schedules. Submittals are critical for communicating on how the Constructor intends to specifically meet the intent of the Construction Documents.
Supporting Registered Professional	<p>The Registered Professional providing supplementary design and/or Field Review services to the Registered Professional of Record for a particular component or sub-component of a discipline.</p> <p>It is recommended that the Registered Professional of Record obtain and retain in the project file any Schedules S-B and S-C from the Supporting Registered Professional, as identified in Appendix A of <i>Practice Note 16: Professional Design and Field Review By Supporting Registered Professionals</i> (AIBC and Engineers and Geoscientists BC 2017).</p>
Supporting Schedule	An accountability document, such as Schedule S-B or Schedule S-C in the form provided in <i>Practice Note 16: Professional Design and Field Review by Supporting Registered Professionals</i> (AIBC and Engineers and Geoscientists BC 2017), which is executed by a Supporting Registered Professional and provided to a Registered Professional of Record for reliance. These schedules provide assurance confirming that the plans and supporting documents relating to the supporting engineering services for a particular component, or sub-component, substantially comply, in all material respects, with the applicable requirements of the Building Code.

VERSION HISTORY

VERSION NUMBER	PUBLISHED DATE	DESCRIPTION OF CHANGES
2.0	February 4, 2020	Revised to address minor errors, provide reference to quality management requirements, improve clarity in the guidance, and provide a focus on climate change and energy efficiency.
1.0	October 2012	Initial version.

1.0 INTRODUCTION

Engineers and Geoscientists British Columbia (the Association) is the regulatory and licensing body for the engineering and geoscience professions in British Columbia (BC). To protect the public, the Association establishes, maintains, and enforces standards for the qualifications and practice of its members and licensees.

The Association provides various practice resources to its members and licensees to assist them in meeting their professional and ethical obligations under the *Engineers and Geoscientists Act*. One of those resources are professional practice guidelines, which establish the standard of practice for specific professional activities. The Association works with experts in their fields to develop professional practice guidelines where additional guidance is beneficial or required.

These *Professional Practice Guidelines – Building Enclosure Engineering Services* provide guidance on professional practice for Engineering Professionals who provide Building Enclosure engineering services for buildings that fall under the *British Columbia Building Code (BCBC)*, the *City of Vancouver Building By-Law (VBBL)*, or the *National Building Code of Canada (NBC)* (defined collectively in these guidelines as Building Code).

In 1999, the Association’s Council adopted the first version of *Guidelines for Professional Practice Building Envelope Professional Engineer*. Members of the Association’s Building Envelope Committee reviewed the 1999 document and other relevant documents, such as the Architectural Institute of British Columbia’s *Bulletin 34: Building Envelope Services – Appropriate Professional Practice*, which was endorsed by the Association, and produced the first version of *Guidelines for Professional Practice – Building Enclosure Engineering Services* in October 2012.

This current revision was undertaken to address minor errors, provide reference to quality management requirements, improve clarity in the guidance, and provide a focus on issues such as climate change and energy efficiency.

1.1 PURPOSE OF THESE GUIDELINES

This document provides guidance on professional practice to Engineering Professionals who provide Building Enclosure engineering services for building projects. These guidelines provide a common approach for carrying out a range of professional activities related to Building Enclosure engineering and design.

Specifically, these guidelines set out the standards of practice that a Building Enclosure Engineer (BEE) must generally follow and meet when providing Building Enclosure engineering services for building projects. (See [Section 1.5 Applicability of These Guidelines](#)).

The design of Building Enclosures is an area of professional practice where both Engineering Professionals and Architects share expertise. Therefore, these guidelines provide some guidance regarding this shared responsibility for various types of building projects.

Following are the specific objectives of these guidelines:

1. Describe the standard of practice that Engineering Professionals should follow when providing professional services related to Building Enclosure engineering services.
2. Specify the tasks and/or services that Engineering Professionals should complete to meet the appropriate standard of practice and fulfill their professional obligations under the *Act*. These obligations include the Engineering Professional’s

primary duty to protect the safety, health, and welfare of the public and the environment.

3. Describe the roles and responsibilities of the various participants/stakeholders involved in these professional activities. The document should assist in delineating the roles and responsibilities of the various participants/stakeholders, which may include the Registered Professional of Record, the BEE, Owner, Authority Having Jurisdiction, and Supporting Registered Professional.
4. Define the skill sets that are consistent with the training and experience required to carry out these professional activities.
5. Provide guidance on the use of assurance documents, so the appropriate considerations have been addressed (both regulatory and technical) for the specific professional activities that were carried out.
6. Provide guidance on how to meet the quality management requirements under the *Act* and Bylaws when carrying out the professional activities identified in these professional practice guidelines.

1.2 ROLE OF ENGINEERS AND GEOSCIENTISTS BC

These guidelines were prepared by subject matter experts and reviewed by various stakeholders. The final draft of these guidelines underwent a final consultation process with various committees and divisions of the Association. These guidelines and the current revision were approved by the Association's Council and, prior to publication, underwent final legal and editorial reviews. These guidelines form part of the Association's ongoing commitment to maintaining the quality of professional services that Engineering Professionals provide to their Clients and the public.

An Engineering Professional must exercise professional judgment when providing professional services; as such, application of these guidelines will vary depending on the circumstances, including where site-specific conditions need to be addressed or in the event that there are changes in legislation, regulations or the Building Code subsequent to the publication of these guidelines. Where an Engineering Professional intends to substantially deviate from following or applying these guidelines, consideration should be made to obtain a second opinion on the merits of the deviation.

The Association supports the principle that appropriate financial, professional, and technical resources should be provided (i.e., by the Client and/or the employer) to support Engineering Professionals who are responsible for carrying out professional activities, so they can comply with the standard of practice provided in these guidelines. These guidelines may be used to assist in the level of service and terms of reference of an agreement between an Engineering Professional and a Client.

These guidelines are intended to assist Engineering Professionals in fulfilling their professional obligations, especially regarding the first principle of the Association's Code of Ethics, which is to "hold paramount the safety, health and welfare of the public, protection of the environment and promote health and safety in the workplace." Failure to meet the intent of these guidelines could be evidence of unprofessional conduct and lead to disciplinary proceedings by the Association.

1.3 INTRODUCTION OF TERMS

1.3.1 DEFINED TERMS

See the [Defined Terms](#) section at the front of the document for a full list of definitions specific to these guidelines.

1.3.2 ACCOUNTABILITY DOCUMENTS

The accountability documents in [Table 1: List of Letters of Assurance and Other Accountability Documents Related to Building Enclosure Engineering Services](#) at the end of this section are referred to in these guidelines.

1.4 SCOPE OF THESE GUIDELINES

These guidelines provide guidance for the practice of Building Enclosure engineering, including for compliance with the requirements of the applicable Building Code and Local Regulations.

These guidelines can be used to assist in establishing the objectives, scope of professional services, level of effort, and terms of reference for an agreement between a BEE and a Client; however, these guidelines are not intended for use as part of the contract between a BEE and a Client.

These guidelines also take into account the commitments that the Authorities Having Jurisdiction may require from BEEs, as set out in the Letters of Assurance and alternate accountability documents.

1.5 APPLICABILITY OF THESE GUIDELINES

These guidelines provide guidance on professional practice for Engineering Professionals who carry out Building Enclosure engineering services. These guidelines are not intended to provide systematic instructions for how to carry out these activities; rather, these guidelines outline considerations to be aware of when carrying out these activities.

An Engineering Professional's decision not to follow one or more aspects of these guidelines does not necessarily mean a failure to meet his or her professional obligations. Such judgments and decisions depend upon weighing facts and circumstances to determine whether other reasonable and prudent Engineering Professionals, in similar situations, could have conducted themselves similarly.

1.6 ACKNOWLEDGEMENTS

This document was reviewed by technical experts, as well as by various committees and divisions of the Association. Authorship and review of these guidelines does not necessarily indicate the individuals and/or their employers endorse all statements in these guidelines.

The Association thanks the authors and reviewers of the original document, as well as the author and reviewers of this revision, for their time and effort in sharing their knowledge and expertise.

The Architectural Institute of British Columbia (AIBC) reviewed and endorsed these guidelines.

Table 1: List of Letters of Assurance and Other Accountability Documents Related to Building Enclosure Engineering Services

SCHEDULE	PURPOSE	SOURCE
Schedule B	Letter of Assurance form: Assurance of Professional Design and Commitment for Field Review	BCBC or VBBL
Schedule C-B	Letter of Assurance form: Assurance of Professional Field Review and Compliance	BCBC or VBBL
Schedule S-B	Intraprofessional form: Assurance of Professional Design and Commitment for Field Review By Supporting Registered Professional	<i>Practice Note 16: Professional Design and Field Review By Supporting Registered Professionals^a</i>
Schedule S-C	Intraprofessional form: Assurance of Professional Field Review and Compliance By Supporting Registered Professional	<i>Practice Note 16: Professional Design and Field Review By Supporting Registered Professionals^a</i>
Model Schedule D	Alternate accountability document: Commitment for Building Envelope Professional Review	<i>Bulletin 34: Building Envelope Services – Appropriate Professional Practice^b</i>
Model Schedule C-D	Alternate accountability document: Completion of Building Envelope Professional Review	<i>Bulletin 34: Building Envelope Services – Appropriate Professional Practice^b</i>
Schedule D-1	Letter of commitment form: Commitment for Building Envelope Professional Review	VBBL
Schedule D-2	Letter of completion form: Completion of Building Envelope Professional Review	VBBL

NOTES:

^a AIBC and Engineers and Geoscientists BC 2017.

^b AIBC and Engineers and Geoscientists BC 2011.

2.0 ROLES AND RESPONSIBILITIES

2.1 COMMON FORMS OF PROJECT ORGANIZATION

Project organization can vary according to the needs of the project. The role and responsibilities of the Building Enclosure Engineer (BEE) varies, depending on the scope of the project and how other Registered Professionals (RPs) are involved.

Depending on the type and location of a project, various Letters of Assurance and/or alternate accountability documents may be required, in accordance with the applicable Building Code, Local Regulations, and the best practices described in these guidelines.

See [Table 2: Summary of the Functional Relationships for the Building Enclosure Portion of Typical Types of Projects](#) for a summary of the functional relationships and responsibilities for the Building Enclosure portion of projects.

2.2 RESPONSIBILITIES

The roles and responsibilities described in this section are consistent with those outlined in *Bulletin 34: Building Envelope Services – Appropriate Professional Practice* (AIBC and Engineers and Geoscientists BC 2011).

- [Section 2.2.7 Enhanced Building Envelope Services](#) of these guidelines provide guidance for situations where an Authority Having Jurisdiction mandates Enhanced Building Envelope Services.
- [Section 2.2.6 Supporting Registered Professional](#) of these guidelines provide guidance on the role of a Supporting Registered Professional (SRP).
- [Section 4.1 Quality Management Requirements](#) of these guidelines provide guidance on the overall responsibilities of Engineering Professionals.

The most current version of the Guide to the Letters of Assurance in the BC Building Code 2006 (Province of BC 2010) should be referenced for a more detailed explanation of the roles and responsibilities with respect to the use of Letters of Assurance by a Registered Professional of Record (RPR).

The Letters of Assurance and other accountability documents relevant to the provision of Building Enclosure engineering services are listed in [Table 1: List of Letters of Assurance and Other Accountability Documents Related to Building Enclosure Engineering Services](#).

Table 2: Summary of the Functional Relationships for the Building Enclosure Portion of Typical Types of Projects

ROLES	PROJECT TYPE				
	NEW BUILDING CONSTRUCTION OR RENOVATIONS	BUILDING ENCLOSURE REHABILITATION OR RENEWAL – SCENARIO 1	BUILDING ENCLOSURE REHABILITATION OR RENEWAL – SCENARIO 2	BUILDING ENCLOSURE REPAIRS	OTHER SERVICES ^a
COORDINATING REGISTERED PROFESSIONAL (CRP)	<ul style="list-style-type: none"> Either an Architect or an Engineering Professional may fulfill the CRP role. 	<ul style="list-style-type: none"> Where required, the Architect usually fulfills the CRP role with the same responsibilities as for a new construction project. 	<ul style="list-style-type: none"> Where required, the BEE usually fulfills the CRP role. 	<ul style="list-style-type: none"> Letters of Assurance and a CRP are not required for projects that do not require a building permit. The BEE must confirm that a building permit is not required for each project before proceeding on that basis. If a permit is required, then the roles for a Rehabilitation project apply. 	<ul style="list-style-type: none"> Letters of Assurance and a CRP are not required for projects that do not require a building permit.
REGISTERED PROFESSIONAL OF RECORD (RPR)	<ul style="list-style-type: none"> An Architect must act as the RPR for the Building Enclosure and submit Schedules B and C-B. The BEE must not submit Schedules B or C-B for the Building Enclosure. 	<ul style="list-style-type: none"> An Architect must act as the RPR for the Building Enclosure and submit Schedules B and C-B. The BEE must not submit Schedules B or C-B for the Building Enclosure. Other RPRs may be required, depending on the scope of services. 	<ul style="list-style-type: none"> When a BEE is the RPR for the Building Enclosure, the BEE submits Schedules B and C-B. Other RPRs may be required, depending on the scope of services. 	<ul style="list-style-type: none"> Not required. See above. 	<ul style="list-style-type: none"> Not required. See above.
SUPPORTING REGISTERED PROFESSIONAL (SRP)^b	<ul style="list-style-type: none"> If required by the RPR, the BEE may submit Schedules S-B and S-C to the Architect RPR, customized for the scope of services provided and in support of the RPR's Schedules B and C-B. 	<ul style="list-style-type: none"> The BEE may submit Schedules S-B and S-C to the Architect RPR, customized for the scope of services provided and in support of the Architect's Schedules B and C-B. Other SRPs may be required, depending on the scope of services. 	<ul style="list-style-type: none"> An Architect or Engineering Professional must review the project scope to identify any need for the involvement of an Architect or other RPs. SRPs may be required, depending on the scope of services and the expertise of the BEE. 	<ul style="list-style-type: none"> Other SRPs may be required, depending on the scope of services and the expertise of the BEE. 	<ul style="list-style-type: none"> SRPs may be required, depending on the scope of services and the expertise of the BEE. Schedules S-B and S-C could be used if desired but are not required.
CONSTRUCTION DOCUMENTS	<ul style="list-style-type: none"> The Architect RPR must prepare and take responsibility for the Construction Documents associated with the Building Enclosure. 	<ul style="list-style-type: none"> The Architect RPR must prepare and take responsibility for the Construction Documents associated with the Building Enclosure. 	<ul style="list-style-type: none"> The BEE acts as RPR for the Building Enclosure and must prepare and take responsibility for the Construction Documents associated with the Building Enclosure. 	<ul style="list-style-type: none"> At minimum, sketches will be required to describe the scope of services, provide necessary details, and specify the materials to be used. 	<ul style="list-style-type: none"> Not typically required.

NOTES:

Abbreviations: BEE = Building Enclosure Engineer; CRP = Coordinating Registered Professional; RP = Registered Professional; RPR = Registered Professional of Record; SRP = Supporting Registered Professional

^a Other Services may include, for example, targeted performance investigations, or condition assessments. See [Section 2.2.5 Other Services](#) for a detailed list.

^b See [Section 2.2.7 Enhanced Building Envelope Services](#) for other types of Building Enclosure accountability documents.

2.2.1 NEW BUILDING CONSTRUCTION OR RENOVATION PROJECT

The following descriptions of roles and responsibilities relate to projects where a BEE is providing services for a new building construction project or for a Renovation project:

- A Coordinating Registered Professional (CRP) will be required for the project and can be either an Architect or an Engineering Professional.
- In accordance with the requirements of the *Architects Act*, where an Architect is required, the Architect must serve as the RPR for the architectural items listed in the Schedule B Letter of Assurance form, including the Building Enclosure, and must have overall responsibility for the design and Field Review of the architectural items.
- The project's Architect RPR must sign and seal the Building Code-mandated Letters of Assurance for the Building Enclosure: Schedule B, Assurance of Professional Design and Commitment for Field Review, and Schedule C-B, Assurance of Professional Field Review and Compliance.
- The project's Architect RPR must prepare an integrated set of Construction Documents for the Building Enclosure.
- In support of the Architect RPR, a BEE may provide SRP services with respect to the performance of the Building Enclosure. While these guidelines only provide guidance for Engineering Professionals in this role, appropriately qualified Architects may also fulfill this supporting role.
- The scope of services for the SRP must be documented in accordance with [Section 3.0 Guidelines for Professional Practice](#) of these guidelines.
- If requested by the Architect RPR, or if otherwise desired by the BEE, Schedule S-B, Assurance of Professional Design and Commitment for Field Review By Supporting Registered Professional, and Schedule S-C, Assurance of Professional Field

Review and Compliance By Supporting Registered Professional may be used as accountability documents, customized for the scope of Building Enclosure services provided. In such a situation, the BEE will sign and seal the Schedules S-B and S-C and will deliver those forms to the RPR for the purpose of recording the BEE's role and performance of work. The Association recommends that Schedules S-B and S-C be used to clarify roles and responsibilities when supporting services are required for a component or system.

- The Architect RPR may provide the BEE's Schedules S-B and S-C to the CRP, but these Supporting Schedules are not Letters of Assurances and are not intended for submission to the Authority Having Jurisdiction.
- Since the Architect RPR has overall responsibility for the design and Field Review of the Building Enclosure, the BEE for this type of project should not sign and seal Schedules B and C-B for the Building Enclosure.

2.2.2 BUILDING ENCLOSURE REHABILITATION OR RENEWAL PROJECT

2.2.2.1 Primary Scenarios

The following descriptions of roles and responsibilities relate to projects where a BEE is providing services for a Building Enclosure Rehabilitation or Renewal project.

There are several possible scenarios for the involvement of a BEE for these types of projects; however, there are two primary scenarios:

1. An Architect acts as the RPR for the architectural items listed in the Schedule B Letter of Assurance form.
2. A BEE acts as the RPR for the architectural items listed in the Schedule B Letter of Assurance form.

2.2.2.2 Rehabilitation or Renewal Project with an Architect as the RPR

The following are the responsibilities for projects where an Architect acts as the RPR:

- When a CRP is required, the Architect RPR usually fulfills the CRP role.
- The Architect is the RPR for the architectural items on Schedule B.
- The Rehabilitation or Renewal project's Architect RPR must sign and seal the Building Code-mandated Letters of Assurance for the Building Enclosure: Schedules B and C-B.
- The Architect RPR must prepare an integrated set of Construction Documents for the Building Enclosure.
- A BEE may provide SRP services in support of the Architect RPR with respect to the performance of the Building Enclosure.
- The scope of these supporting Building Enclosure services must be documented and provided in accordance with [Section 3.0 Guidelines for Professional Practice](#) of these guidelines.
- If requested by the Architect RPR, or as desired by the BEE, Schedules S-B and S-C may be used as accountability documents, customized for the scope of Building Enclosure services provided, in support of the Architect RPR. The Association recommends that Schedules S-B and S-C be used to clarify roles and responsibilities when supporting services are required for a component or system.
- At the RPR's discretion, copies of the executed Schedules S-B and S-C may be provided by the RPR to the other RPs, the CRP, and/or the Client.
- Schedules B and C-B for architectural elements are not to be used or signed by the BEE.

2.2.2.3 Rehabilitation or Renewal Project with a BEE as the RPR

The following are the responsibilities for projects where a BEE acts as the RPR:

- A CRP may or may not be required for the project, depending on the need for multiple RPRs. When a CRP is required, the BEE RPR usually fulfills this role.
- The BEE is the RPR for the architectural items on Schedule B.
- The Rehabilitation or Renewal project's BEE RPR must sign and seal the Building Code-mandated Letters of Assurance for the Building Enclosure: Schedules B and C-B.
- In accordance with *Bulletin 34: Building Envelope Services – Appropriate Professional Practice*, an Architect or, in some limited circumstances, an Engineering Professional, must undertake a preliminary review of the Rehabilitation or Renewal program for all Building Enclosure Rehabilitation or Renewal projects, to identify issues that are beyond the scope of services that can be provided by the BEE RPR and to determine whether any work by an Architect or other RPs is required; this review must be undertaken prior to applying for a building permit (AIBC and Engineers and Geoscientists BC 2011).
- The BEE RPR must prepare an integrated set of Construction Documents for the Building Enclosure.
- Since the BEE is also the RPR in this scenario, a separate SRP for the Building Enclosure is not normally required.

2.2.3 BUILDING ENCLOSURE REPAIRS

A BEE may provide services related to a localized Building Enclosure performance problem. These projects are targeted, and are focused either on a specific failed element of the Building Enclosure, or on one area of the building (e.g., localized window or roof leak).

The BEE should confirm the building permit requirements with the Authority Having Jurisdiction. If a permit is required, then the roles and responsibilities for a Rehabilitation project apply.

If a building permit is not required, there is no need for submission of the Letters of Assurance required by the Building Code; however, depending on the scope of the project, several RPs may be required, in which case Schedules S-B and S-C can be used as accountability documents.

Sketches or drawings will be required to describe the scope and nature of the construction work to be performed, as well as to specify the materials to be used.

2.2.4 ENERGY USE ASSESSMENT AND WHOLE BUILDING ENERGY MODELLING

A BEE may provide services related to building energy performance. This may include whole Building Energy Modelling and/or specific inputs related to the energy model.

A BEE may provide SRP services with respect to the overall building energy performance.

When a BEE provides Building Energy Modelling services, the modelling may be completed by the BEE as the energy modeller or by a qualified modeller under the Direct Supervision of the BEE. A qualified modeller is an individual who through education, training, and experience is competent in simulation, science and systems that pertain to building energy performance, and who may or may not be a RP.

For guidance on the topic of Building Energy Modelling, see the *Joint Professional Practice Guidelines – Whole Building Energy Modelling Services* (AIBC and Engineers and Geoscientists BC 2018).

2.2.5 OTHER SERVICES

In addition to the services listed above, the BEE may also provide services for other types of projects. These services may include, but are not limited to, the following:

- Building Enclosure condition assessments
- Building asset management planning
- Targeted investigations of Building Enclosure performance issues
- Second opinions
- Warranty reviews
- Litigation support
- Risk assessments
- Testing of elements of the Building Enclosure
- Product or system development or evaluations

For these and other types of projects, the scope of services may vary greatly. The roles and responsibilities of the BEEs may be stipulated by agreement with Clients, legislation, regulations, and/or industry practices. Ultimately, it is the responsibility of the BEE in any such project to provide an informed engineering opinion and apply knowledge, as discussed in [Section 5.2.2.1 Application of Knowledge](#).

2.2.6 SUPPORTING REGISTERED PROFESSIONAL

The RPR for the architectural items listed in the Schedule B (an Architect for a new construction project, and either an Architect or a BEE for a Rehabilitation or Renewal project) takes responsibility for the design of the Building Enclosure. The RPR may rely upon the work and assurances of other RPs when taking responsibility for the Building Enclosure.

For example, another Architect, a BEE, a mechanical engineer, or an engineer working for a window manufacturer may provide specific modelling and analysis services to support the energy performance values that are being provided and used for the project. In these instances, where another RP is providing support services, Schedules S-B and S-C, which are endorsed by the AIBC and the Association, are the appropriate accountability documents to be provided to the RPR.

Supporting architectural or engineering services may also be obtained by the RPR from other RPs, for instance, in respect of the following architectural items listed in the Schedule B Letter of Assurance form:

- 1.1 Fire resisting assemblies
- 1.5 Performance and physical safety features (guardrails, handrails, etc.)
- 1.6 Structural capacity of architectural components, including anchorage and seismic restraint
- 1.7 Sound control
- 1.24 Building envelope, Part 10 – ASHRAE, NECB or Energy Step Code requirements

The following notes describe the use of SRPs and Schedules S-B and S-C:

- Schedules S-B and S-C are not Letters of Assurance and, therefore, are not intended to be submitted to the Authorities Having Jurisdiction.
- The use of an SRP is not mandatory, and the RPR is required to exercise professional judgment to assess whether the engagement of an SRP is necessary.
- SRPs may be engaged, and Schedules S-B and S-C used, even if a project doesn't require Letters of Assurance.
- Schedules S-B and S-C should be completed to suit the scope of services provided and can include design support services, Field Review services, or a combination of both services.

Practice Note 16: Professional Design and Field Review by Supporting Registered Professional (AIBC and Engineers and Geoscientists BC 2017) and *Bulletin K: BCBC – Letters of Assurance in the BC Building Code and Due Diligence* (Engineers and Geoscientists BC 2010) should be consulted with respect to the appropriate use of Supporting Schedules S-B and S-C.

For a typical construction project with an Architect RPR, the BEE providing Building Enclosure SRP services will provide Supporting Schedules S-B and S-C to the RPR responsible for the Building Enclosure as part of

the architectural portion on Schedules B and C-B. The Supporting Schedules may also be provided to the CRP but are not intended to be provided to the Authority Having Jurisdiction.

2.2.7 ENHANCED BUILDING ENVELOPE SERVICES

Some Authorities Having Jurisdiction have mandated a requirement for Enhanced Building Envelope Services and use alternate accountability documents which specifically evidence the provision of those services.

The BEE must provide Enhanced Building Envelope Services in accordance with *Bulletin 34: Building Envelope Services – Appropriate Professional Practice* (AIBC and Engineers and Geoscientists BC 2011) and only sign alternate Building Enclosure schedules that are consistent with *Bulletin 34's* Model Schedule D: Commitment For Building Envelope Professional Review, and Schedule C-D: Completion of Building Envelope Professional Review.

Examples of approved alternate Building Enclosure schedules are Schedules D-1 and D-2 from the VBBL (City of Vancouver 2014), and Schedules E-1 and E-2 from the Burnaby Building By-Law (City of Burnaby 2016). It should be noted that, unlike the Supporting Schedules which are not submitted to an Authority Having Jurisdiction for building permitting purposes, an Authority Having Jurisdiction may require these schedules to be submitted.

2.2.8 ACCOUNTABILITY DOCUMENTS FOR PART 9 BUILDINGS

The Building Code does not generally require that Letters of Assurance be submitted for Building Enclosures of Part 9 buildings.

The only exception relates to Part 9 buildings designed with common egress systems and requiring the use of firewalls, as referenced in the *BCBC*, Division C, Clause 2.2.7.1.(1)(c). There may be some instances where the design of an element of the Building Enclosure falls outside the scope of Part 9; in such instances, it may be appropriate to provide Schedules B

and C-B that are completed as appropriate to indicate the specific scope of accountability.

Some Authorities Having Jurisdiction may request that Letters of Assurance be submitted generally for the Building Enclosures of Part 9 buildings. BEEs are cautioned that the Association does not support their signing and sealing of Schedules B and C-B for such purpose, as that could introduce an inappropriate level of responsibility for the BEE. It is also inappropriate to use Supporting Schedules, because they are intended to be used in support of another RP and are not intended for submission to Authorities Having Jurisdiction.

BEEs should be cautious when using accountability documents for Part 9 buildings and when using documents that the Association has not endorsed. Care must be taken when modifying the basic wording of Letters of Assurance or Supporting Schedules to ensure they reflect the intended scope of services and accountability, and are in accordance with the Guide to Letters of Assurance in the BC Building Code 2006 (Province of BC 2010). In many instances, providing a signed and sealed letter that confirms the scope of services is more appropriate for Part 9 buildings.

2.2.9 RELIANCE ON OTHERS

The BEE may rely upon others for some aspects of the scope of services, and some items within the BEE's scope may also require review by other RPRs on the design team, or by testing or inspection agencies. Such work may include roofing and waterproofing, glazing, pre-manufactured elements, proprietary products, and Secondary Structural Elements.

The involvement of others, however, does not relieve the BEE of the responsibility to ensure the design review and Field Reviews of the other RPs are appropriately undertaken and, in the BEE's professional opinion, are acceptable. The BEE must be aware of the limitations in scope or applicability of the review, testing, and inspection services provided by others.

2.2.10 DESIGN OR FIELD REVIEW ONLY

The same RP should be responsible for the design documents and Field Reviews. *Bulletin K: BCBC – Letters of Assurance in the BC Building Code and Due Diligence* (Engineers and Geoscientists BC 2010) discusses the potential difficulties encountered when design documents and Field Reviews are prepared or conducted by different RPs.

There may be some instances where a BEE may not be involved in the design stage of a building but is involved in undertaking Field Review on behalf of another RPR. This scenario primarily arises when the RPR is remotely located and a local BEE is retained to carry out the Field Reviews. In such instances, it is required that prior to agreeing to undertake the Field Reviews, the BEE undertake a review the design and ascertain that the design is appropriate.

For more information, see [Section 4.1.6 Documented Field Reviews During Implementation or Construction](#).

2.2.11 MULTIPLE BEES ON ONE PROJECT

Some projects require more than one BEE to be working on the same project concurrently, each with a different scope of work. Each scope may involve the provision of different services or may be related to a different component or aspect of the building.

It should be noted that such cases present the potential for gaps or overlap in the provision of services by the different BEEs. It is recommended that each BEE's scope of work be reviewed by the other BEE(s) to identify possible gaps or overlaps. The discovery of any gaps or overlap should be communicated in writing to the Client and CRP, and adjustments should be made to the scope(s) of work to resolve any issues.

2.2.12 SPECIALTY CONSULTING SERVICES PROVIDED BY OTHERS

Specialty engineering or various consulting services provided by others may impact the services of a BEE (e.g., Roofing Contractors Association of British Columbia [RCABC] roof inspectors, secondary structural engineers, curtain wall consultants, LEED™ consultants).

The BEE must be aware of other such consultants and must understand that their work and involvement does not relieve the BEE of his or her project responsibilities. For example, even if RCABC inspection services are provided by others, the BEE RPR for a Rehabilitation project must take responsibility for the roof(s) and accordingly execute Letters of Assurance.

2.2.13 SELECTION OF CONSULTANTS

Recommended processes for selecting engineering consultants are described in various publications:

- Appointing Your Consulting Engineer Using Qualifications Based Selection (ACEC-BC 2006)
- User Guide to Implementing Qualifications Based Selection – Best Practices for Selecting Your Design Professional (ACEC-BC 2016)
- InfraGuide: Best Practice – Selecting a Professional Consultant (FCM and NRC 2006)

The Association supports the principle that appropriate financial, professional, and technical resources should be provided (i.e., by the Client and/or the employer) to support Engineering Professionals, including BEEs, who are responsible for carrying out professional activities, so they can comply with the standards of practice outlined in these guidelines. These guidelines may be used to assist in determining the appropriate level of service and the terms of reference for an agreement between an Engineering Professional and a Client. BEE's should also refer to Budget Guidelines for Consulting Engineering Services (ACEC-BC and Engineers and Geoscientists BC 2009).

2.2.14 PROFESSIONAL LIABILITY INSURANCE

Before entering into an agreement to provide professional engineering services to the public, the Association's Bylaw 17 requires that a BEE must notify the Client, in writing, whether or not professional liability insurance is held and the extent to which that insurance is applicable to the services provided.

2.2.15 REFERRAL FEES

BEEs are strongly advised against accepting or providing referral fees or other such compensation in connection with a project for which they are providing Building Enclosure services. If a BEE does participate in a referral fee arrangement, then, at a minimum, the nature of the referral fee must be fully disclosed to the Client and other parties to the project.

3.0 GUIDELINES FOR PROFESSIONAL PRACTICE

3.1 OVERVIEW

The following subsections provide guidance on the technical services that a Building Enclosure Engineer (BEE) may provide for a building project. They are organized into three primary categories:

1. Construction Project Services
2. Other Building Enclosure Services for Construction Projects
3. Other Services

The services described below are not intended to be exhaustive, or to include all the services that may be provided by a BEE, and should be considered in conjunction with other provisions of these guidelines.

3.2 SCOPE OF WORK

Before commencing services, the BEE must communicate with the Client and other team members as required to:

- determine and agree upon the terms of reference, confirm the scope of services to be provided, and confirm the elements of the Building Enclosure for which the services are applicable;
- reach an agreement on fees, payment schedule, and professional liability insurance; and
- draw up a written contract.

The following Association of Consulting Engineers Canada (ACEC) standard agreements are recommended as the basis for a contract:

- ACEC Document 31 – 2010 Engineering Agreement between Client and Engineer (ACEC 2010)
- ACEC Document 32 – 2011 Agreement between Engineer and Subconsultant (ACEC 2011)

Alternately, the following AIBC standard agreements may be used:

- AIBC Document 6C – 2007 Standard Form of Contract 6C Between Client and Consultant (AIBC 2007)
- AIBC Document 8C – 2010 Standard Short Form Contract between Client and Consultant (AIBC 2010)

3.3 CONSTRUCTION PROJECT SERVICES

The basic scope of services described in this section outlines the BEE's responsibility with respect to the Building Enclosure performance issues of the Building Code.

Each type of project will dictate different roles and responsibilities for the BEE. Several typical kinds of project organization are described in these guidelines, and the scope of engineering services provided will vary for each type of project. For example, work on an existing building will mean that certain design parameters have already been determined or resolved.

Similarly, the different roles on projects will dictate a different scope of services for a BEE. For a new construction project, an Architect will usually be the Registered Professional of Record (RPR); the BEE may provide supporting coordination, design, Construction Documentation, and/or Field Review services. On a Rehabilitation or Renewal project, the BEE may be the RPR and the Coordinating Registered Professional (CRP). These additional roles and responsibilities are outlined in [Section 2.2.2.3 Rehabilitation or Renewal Project with a BEE as the RPR](#) and are distinct from the BEE's technical services described in this section.

The BEE's technical tasks undertaken when assessing and providing guidance regarding the control of heat, air, and moisture, and other performance attributes that may form part of the scope, are the same for both new construction projects and for Rehabilitation and Renewal projects. Differences arise in the way information is communicated or documented, which varies by project type.

The descriptions of the following technical tasks according to project phase are primarily in the context of a new construction project; the delivery mechanism will vary, depending on project type and scope.

3.3.1 CONCEPTUAL OR SCHEMATIC DESIGN PHASE

In the conceptual or schematic design phase, the BEE provides the following services:

- Attend, as required, meetings with the applicable RPs and the design team to obtain information regarding the functional, aesthetic, cost, and scheduling requirements.
- Focus on the Building Enclosure Elements and performance requirements appropriate to the agreed scope of services.
- Assist the design team in identifying the need for any other RPs to address the Building Enclosure performance requirements for the project.

- Define the Building Enclosure design criteria and loads for the location, intended use and occupancy, and review the criteria with the design team. The criteria includes interior and exterior environmental loads, and design criteria related to condensation control, water penetration control, heat, air, and moisture transfer, and other performance criteria, as is appropriate for the scope of services provided for the project.
- Review applicable Building Code, standards, Local Regulations, restrictions, insurance or warranty requirements, and other factors affecting the design of the Building Enclosure to meet the performance requirements for the Building Enclosure.
- Review the compatibility and interaction of the Building Enclosure with other building systems.
- Review the preliminary design concept, together with alternate design concepts where appropriate.
- Consider the requirements of other RPs and provide information relating to the Building Enclosure design, as they may reasonably require.
- Document the results of this phase in a format suitable to the design team and the Client.

3.3.2 DESIGN DEVELOPMENT PHASE

In the design development phase, the accepted conceptual design is developed in sufficient detail to enable the commencement of the Construction Documents by all participants in the design team.

During this stage, the BEE provides the following services:

- Review preliminary drawings of assemblies for Building Enclosure elements in accordance with the agreed scope of services, which may include the review of walls, windows and other glazed elements, roofs, balconies, decks, below-grade and at-grade elements, and typical interface details between these assemblies, to confirm that they can meet the established design criteria. This review should also consider constructability.

- Review the durability of Building Enclosure elements, and consider Maintenance, Renewal, and Service Life requirements. The guidance on durability should include disclosure of expected service lives, as well as the impact of design decisions on likely Maintenance and Renewal activities (nature of activity and frequency). Specific consideration should be given to the following items:
 - Expected Service Life of the Building Enclosure elements and associated performance attributes
 - Expected Service Life of the Building Enclosure elements relative to the Client’s mandate
 - Consideration of the layering of Building Enclosure elements, so that Repair and replacement of elements with shorter Service Lives does not require the removal or replacement of items with longer Service Lives
 - Materials’ compatibility with and resistance to various mechanisms of deterioration, given the nature, function, and exposure of the materials
- Document the results of this phase in a format suitable to the design team and the Client.
- Assist in establishing testing and inspection requirements.
- Assist in obtaining the required approvals, licences, and permits, including preparing the relevant documentation required by Local Regulations and the Authorities Having Jurisdiction.
- Where required, complete, sign, and seal required Letters of Assurance or alternate accountability documents (including, for example, VBBL Schedules D-1 and D-2) and submit them to the Authority Having Jurisdiction; alternatively, complete and submit the appropriate Model Schedules D and C-D and/or Supporting Schedule to the RPR (see [Section 2.0 Roles and Responsibilities](#)).
- Document the results of this phase in a format suitable to the design team and the Client.

3.3.3 CONSTRUCTION DOCUMENTS PHASE

In the Construction Documents phase, the BEE provides the following services:

- Review the Construction Documents to verify they adequately describe Building Enclosure elements and meet the intent of the Building Code, and ascertain that the design can achieve the design criteria established during the conceptual or schematic design phase and further developed during the design development phase. Specifically, this review must include:
 - the continuity and placement of thermal insulation and moisture, air, and vapour barriers; and
 - confirmation of drainage paths.
- Provide technical input for the Specifications.

3.3.4 CONSTRUCTION PROCUREMENT PHASE

In the construction procurement phase, the BEE provides the following services:

- Assist the applicable RPs in preparing addenda to the Construction Documents.
- Provide supplementary information to clarify the Construction Documents, as required, during the tender and negotiation process.

3.3.5 CONSTRUCTION PHASE

In the construction phase, the BEE provides Field Review services for all Building Enclosure elements that the BEE designed or reviewed in earlier project phases.

Field Reviews may include the review of proprietary components such as windows that were designed by an Engineering Professional for a manufacturer. In this case, a Field Review is undertaken to review the integration of this component into the overall Building Enclosure, and to complete a quality assurance check to help confirm that the installed component meets the overall performance criteria.

Some items reviewed by the BEE may also require review by others on the design team or by testing or inspection agencies. Such items may include waterproof membranes, glazing, pre-cast concrete elements, welding, proprietary products, and primary and Secondary Structural Elements.

Construction phase Field Review services include, but are not necessarily limited to, the following, and may vary depending upon the complexity of the project and the experience of the contractor:

- Attend construction meetings, as required.
- Assist in confirming, reporting, and scheduling procedures for testing and Field Reviews.
- Assist in confirming that the qualifications of fabricators meet the Specifications.
- Assist in review of Submittals for general compliance with the Construction Documents.
- Assist with the review of Building Enclosure related shop drawings and other Submittals for general conformance with the Construction Documents and the intent of the design.
- Visit the site at sufficient frequency and extent, at the BEE's sole discretion, to ascertain whether the work substantially complies with the Construction Documents and applicable portions of the Building Code. The Field Review must include all assemblies and a substantial number of the details—rather than just a representative sampling—for those elements reviewed or designed by the BEE in earlier project phases. These Field Reviews by the BEE do not replace the Field Review requirements of the Architect RPR for the Building Enclosure on new construction or Renovation projects.
- Prepare Field Review reports outlining observations and discrepancies in the work and deliver them to the attention of the applicable RPR and the CRP.
- Track discrepancies noted during Field Reviews, and note the resolution of these discrepancies, so a list of unresolved discrepancies can be provided to the project team at any stage of the project. The BEE must attempt to confirm that

discrepancies have been resolved in a satisfactory manner. This confirmation is preferably achieved through direct observation, but when this is not possible, other members of the design and construction team can be relied upon to confirm resolution.

- Review reports provided by material and component manufacturers, as well as other reports prepared by RPs who are reviewing Building Enclosure elements.
- Assist in arranging for and observing the mock-up and/or testing of key Building Enclosure elements, such as wall assemblies or window installations, where required.
- Review the continuity of thermal insulation and moisture, air, and vapour barriers.
- Review drainage paths.
- Review the acceptability of the moisture content of wood products.
- Confirm that components and materials used are those specified in the Construction Documents or are acceptable alternatives.
- Upon completion of construction, complete, sign, and seal the applicable Letters of Assurance, Model Schedules D and C-D, and/or Supporting Schedules, and submit them to the appropriate recipients.

3.3.6 REPORTING

As an integral part of the BEE's services, the BEE must:

- ensure the results of the design and Field Reviews are effectively documented and communicated to applicable members of the design team; and
- provide written notice to applicable members of the design and construction team and their Client(s), as appropriate, regarding the implications and consequences of decisions and actions contrary to, or inconsistent with, the BEE's advice.

For more information, see [Section 4.1.4 Retention of Project Documentation](#).

3.4 OTHER BUILDING ENCLOSURE SERVICES FOR CONSTRUCTION PROJECTS

The services described in this section may be provided outside of Enhanced Building Envelope Services. These services are provided by a BEE in connection with a new building, Renovation, Renewal, Rehabilitation, or Repair project.

3.4.1 SEPARATION OF DISSIMILAR INDOOR ENVIRONMENTS

Building components, materials, and assemblies that separate dissimilar indoor environments fall within the scope of Part 5 of the Building Code. Such separations may include walls and floors between high-humidity environments such as pools, hot tubs, and other indoor spaces.

The BEE's responsibilities may include these environmental separations as part of the scope of services; however, in addressing the exterior environmental separation, it is not intended that the BEE take on responsibility for the environmental separation of pools, shower enclosures, and similar features. If the BEE has the relevant expertise, the environmental separation of these features could be undertaken as optional services in the BEE's contract.

The BEE must work with other project RPs such as the Architect RPR or the CRP to establish if there are significantly dissimilar indoor environments that require the BEE's involvement.

3.4.2 BELOW-GRADE ASSEMBLIES

Below-grade and at-grade assemblies are sometimes included as part of the services a BEE provides. If these elements are included, the BEE must have knowledge of groundwater transport mechanisms and management techniques.

When selecting and designing the appropriate methods and materials for water management below grade, the BEE must coordinate with the geotechnical engineer, civil engineer, mechanical engineer, structural engineer, and RPR responsible for site drainage.

For these types of services, the BEE must consider the following:

- Ground conditions and expected groundwater source rates
- Likely ability of drainage systems to control local or general occurrence of hydrostatic pressures
- Interior occupancies of below-grade space and consequences of water penetration into these spaces, and other conditioning requirements
- Requirements for waterproofing and/or damp-proofing
- Waterproofing and damp-proofing methods, systems, and materials, and how they are practically used in construction
- Applicability and probable effectiveness of Repair methods

3.4.3 SECONDARY STRUCTURAL ELEMENTS

Section 5.2 of the Building Code contains the requirements to accommodate structural loads imposed by the Building Enclosure. These requirements include the design and anchoring of Building Enclosure assemblies and the attachment of cladding elements.

If the design of Secondary Structural Elements is included in the scope of services provided by the BEE, then the BEE must have practical experience and knowledge of secondary structural issues, including framing systems, structural attachment, and anchoring. If a BEE undertakes secondary structural design, the BEE must have appropriate training and experience in structural design, and must undertake the work in conformance with good engineering practice. The BEE must also be familiar with the appropriate standards and applicable guidelines, and coordinate with the appropriate RPR.

3.4.4 SNOW AND ICE CONSIDERATIONS

A BEE may need to consider the management of moisture loads from accumulated snow and ice. To address these loads for buildings in some locations, the BEE must have specialized knowledge and experience. To minimize the potential for safety hazard due to the shedding of snow and ice from roofs, a BEE may provide services related to the design of snow-retention systems and other applicable measures.

A BEE who provides these services must have gained specialty knowledge through education and practical experience in the design, installation, and review of the performance of snow management systems. The BEE must coordinate with the CRP, the structural RPR, the Architect RPR, and any other affected RPR.

3.4.5 ACOUSTIC DESIGN

Parts 5 and 9 of the Building Code contains requirements for the design of acoustic separations. The required knowledge of acoustic design is not normally part of the expertise of a BEE. Acoustic design is considered an optional specialty service and is usually provided by a consultant specializing in acoustics.

3.4.6 ENERGY USE ASSESSMENT AND WHOLE BUILDING ENERGY MODELLING

The BEE may be retained to assess and/or predict the energy use in a building or a portion of a building. This work often involves modelling the building performance using simulation software.

When providing whole Building Energy Modelling Services, the BEE may undertake these services by acting as the energy modelling supervisor or as the qualified modeller, as defined in *Joint Professional Practice Guidelines – Whole Building Energy Modelling Services* (AIBC and Engineers and Geoscientists BC 2018). The BEE should follow those guidelines when providing such services.

3.4.7 HEAT TRANSFER

The BEE may be retained to determine thermal resistance of Building Enclosure assemblies (effective thermal performance) and components (linear and point transmittance) for use in determining compliance with energy performance requirements of the Building Code and reference standards. Alternately, this information may be used as input data for simulations of energy performance characteristics or for sizing of heating and cooling systems. When accepting such assignments, the BEE must provide the effective thermal performance of assemblies as determined by good engineering practices and must identify and document the methodology, assumptions, and exclusions.

The BEE may be retained to conduct 2D or 3D thermal modelling of a Building Enclosure assembly, component, or interface. The BEE must understand the limitations of the simulation software and assumptions made in modelling the condition. In order to allow for an audit by another consultant, the BEE must identify any assumptions in the modelling that may affect the estimated thermal performance.

The BEE may determine the effective heat transfer for a given assembly, component, or interface through a Building Enclosure using published thermal conductivity values. The BEE should have specialized expertise in approximating the thermal similarities between published data and the project-specific conditions. When referencing published literature, the BEE must understand the limitations of, and assumptions made in, the published values. In order to allow for an audit by another consultant, the BEE must identify any conditions that deviate from the published condition and the associated effects on the estimated thermal performance.

3.4.8 REDUCTION OF CARBON EMISSION

Opportunities to reduce carbon emissions may lie in the realm of Building Enclosure design.

Engineering Professionals are encouraged to inform their Clients of opportunities to reduce carbon emissions in project activities, for both new construction projects and Renovation projects.

The following could be considered:

- Embodied carbon in construction
- Operational carbon emissions
- Improvement in efficiency of Building Enclosures, to reduce heating, cooling, and air replenishment loads

3.4.9 VULNERABILITY TO CLIMATE CHANGE

Engineering Professionals are expected to keep informed about the changing climate and consider potential impacts of climate change on their professional activities.

BEEs are encouraged to inform Clients about the implications of climate change. If the Client elects to consider climate change impact on the building, a climate change vulnerability study proportionate to the size and complexity of the project should be carried out to inform the design of the Building Enclosure.

The Association has undertaken several initiatives to explore the impact of climate change on professional engineering and geoscience practice and maintains relevant literature in the “Climate” section of the Association’s website, under Practice Resources (Engineers and Geoscientists BC 2019).

The following Association documents address the topic of climate change:

- Engineers and Geoscientists BC Position Paper on human-induced climate change (Engineers and Geoscientists BC 2016).
- Engineers and Geoscientists BC Climate Change Position Paper on evolving responsibilities for engineers and geoscientists (Engineers and Geoscientists BC 2014)

The following resources, among others, are available to guide a Client’s decision to consider climate change in the building design:

- Engineers and Geoscientists BC Climate Change Information Portal: egbc.ca/Practice-Resources/Climate/Climate-Change-Information-Portal
- Pacific Climate Impacts Consortium: plan2adapt.ca
- Public Infrastructure Engineering Vulnerability Committee (PIEVC): pievc.ca

Climate change vulnerability studies are typically a multi-stakeholder endeavour that considers climatology predictions and the Owner’s tolerance of risk. It is not intended that a climate vulnerability study considers all possible scenarios.

3.4.10 COMMISSIONING

Commissioning is a process for achieving, verifying, and documenting that the performance of the building meets the project objectives and requirements.

Commissioning includes four main components:

1. Definition of Owner project requirements
2. Confirmation of the performance
3. Documentation of the process
4. Direct reporting of the results

Building Enclosure commissioning involves tasks similar to those required for Building Enclosure engineering services, including review of the design and construction, and performance testing such as air and water testing to confirm that as-built assemblies meet project requirements.

The roles and responsibilities described in [Section 2.2.1 New Building Construction or Renovation Project](#) and [Section 2.2.2 Building Enclosure Rehabilitation or Renewal Project](#) apply when commissioning is undertaken as part of a project.

A number of documents provide guidance on commissioning:

- CSA Standard Z320 – Building Commissioning (CSA 2016)
- ASHRAE Standard 202 – Commissioning Process for Buildings and Systems (ASHRAE 2018)
- ASTM E2813 – Standard Practice for Building Enclosure Commissioning (ASTM 2018)
- ASTM E2947 – Standard Guide for Building Enclosure Commissioning (ASTM 2016)
- Alberta Infrastructure – Guideline for Building Envelope Commissioning: New Buildings (Government of Alberta 2016)

3.4.11 DURABILITY

The BEE must consider the durability of materials in the environment to which they will be exposed, as well as the overall durability of the Building Enclosure. The purpose of the assessment of durability and Service Life expectancy is to allow the Owner to make informed decisions; however, it is not a guarantee of Service Life performance. Many factors will impact the actual Service Life of Building Enclosure assemblies, components, and materials.

Formal evaluations of the durability of Building Enclosure assemblies, such as those required for the LEED™ durability credit, requires additional knowledge in the consideration of durability. The reporting for a durability assessment must be appropriate for the intended purpose; that is, to show compliance with LEED™, if required. Reporting must identify all input assumptions and judgments of life expectancies in a manner that will allow it to be audited by another consultant. Documents such as CSA Standard S478 – Durability In Buildings (CSA 2019) provide guidance in this area.

3.5 OTHER SERVICES

In addition to the services described for construction projects, the BEE may also provide services for projects that will not normally be associated with the actual construction of a building and do not involve the preparation of Construction Documents. Other services could include any of the services described in the following subsections.

3.5.1 BUILDING ENCLOSURE CONDITION ASSESSMENTS

Building Enclosure condition assessments are carried out for several purposes, and the extent of reviews and reporting requirements will vary by purpose.

Two assessments are of particular relevance to the practice of a BEE:

1. Condition assessments for Maintenance, Renewal, Repair, and Rehabilitation planning purposes
 - Condition assessments can be commissioned to establish baseline information to be relied upon in establishing the need for Maintenance, Renewal, major Repairs, or Rehabilitation of the Building Enclosure. Furthermore, the baseline information may represent the basis for planning of future capital expenditures for the Building Enclosure.
 - The level of detailed investigation and the extent of sampling of conditions must be sufficient to clearly establish the current conditions and future prognosis for performance. The information must also be sufficiently detailed so it can be used to support recommendations for targeted Repairs, systemic Renewal, or Rehabilitation. The publication entitled Building Envelope Rehabilitation Consultant Guide and Owner/Property Manager Guide (CMHC 2000) is considered a guideline for appropriate engineering practice in this area.

- Decisions regarding the necessity for Maintenance, Renewal, Repair, or Rehabilitation may be made by the Client based on a variety of factors, including the current conditions and future prognosis for performance. While the Client may consider other factors, the BEE must clearly differentiate between factors related to the BEE's findings of the current condition, and other circumstantial factors such as market value that may inform decisions regarding the Building Enclosure. The BEE must limit comments and advice to areas within the BEE's expertise. Other factors that the Client may consider can include financing, insurance, warranty, and real estate value.
 - Often several alternate Renewal, Repair, or Rehabilitation approaches can be presented to address the current conditions. It is important that the BEE identify and present the relative technical advantages of alternate strategies.
2. Due Diligence Assessments
- ASTM E2018 – Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process (ASTM 2015) outlines process and reporting requirements for walk-through visual assessments appropriate for some applications, such as real estate transactions (due diligence assessments) and initial risk reviews that do not include exploratory openings, physical sampling of conditions, or testing. These condition assessments are commissioned by Owners and prospective Owners to establish building quality, future performance risks, and potential costs. This level of assessment is typically not as detailed as those assessments used for Maintenance, Renewal, Repair, and Rehabilitation planning purposes.

3.5.2 BUILDING ASSET MANAGEMENT PLANNING

BEEs may provide services related to planning for Maintenance and Renewal for buildings. The terminology used for describing these types of planning projects is not consistent within the industry. The services provided may include the preparation of maintenance manuals, depreciation reports, and reserve fund studies. While these projects are focused on physical elements of the building, they are also financial planning tools. Therefore, the BEE involved in these projects must clearly present the assumptions made with respect to financial information and estimates, accuracy, potential upgrades, validity of future projections, and any other limitations.

In such planning projects, a BEE will typically obtain basic quantifiable information related to the building systems (size, extent, and age of various elements) from the available drawings; however, those drawings may not provide sufficient and relevant information for assessing the current condition of the building. The BEE must identify such limitations of the gathered information in the BEE's reporting.

The BEE may take the lead in preparing multi-system plans and include other building systems in addition to the Building Enclosure. In these instances, it is important that the team uses consistent assumptions and that it is clear how the interfaces between the systems are addressed.

The following educational resources address building asset management planning, in particular reserve studies:

- Real Estate Institute of Canada website, under Resources, Knowledge Now, Reserve Funds/Real Estate Finance (Real Estate Institute of Canada 2019)
- Canada Mortgage and Housing Corporation (CMHC), Capital Replacement Planning Manual (CMHC 2003)
- Canadian Condominium Institute website, under Resource Centre (CCI 2019)

3.5.3 TARGETED INVESTIGATIONS

Targeted investigations focus on identifying the cause and appropriate Repair work to address a specific performance problem or failure. The scope is usually limited to one area of a building or one aspect of the construction. Targeted investigations often use similar techniques as those employed in Building Enclosure condition assessment projects; however, there is a greater need to clearly identify the cause-to-effect scenarios associated with the performance problem or failure. This type of information is necessary when the findings and associated report will be used to assist in resolving a dispute.

Often several alternate Repair approaches can be considered to address the performance problem(s). It is important that the BEE identify and present the relative advantages of alternate strategies.

3.5.4 SECOND OPINION ENGAGEMENTS

Second opinions on the works of other RPs may be requested for a variety of reasons. When undertaking second opinion assignments, a BEE should:

- notify the involved RPs, where possible, that a second opinion review is being undertaken;
- review documents and provide an impartial assessment of whether
 - the original work conformed to appropriate industry practice,
 - a reasonable range of alternatives were considered, and
 - the data obtained for the original work supports the recommendations that were given;
- recommend an additional investigation where that is necessary for providing an accurate second opinion;
- review opinions of estimated costs and provide a second opinion on whether the estimates appear to be appropriate; and
- encourage the Client to provide the report containing the second opinion to the original RPs for their review and response.

3.5.5 WARRANTY REVIEWS

Warranty reviews are undertaken to assist in the identification of issues that may result in a warranty claim. The warranty under consideration could be a third-party warranty such as the one required under the *Homeowner Protection Act*, a product warranty, or other warranty as specified in the Construction Documents. Prior to the commencement of the services, the BEE must confirm the specific warranty product(s) that are the focus of the review, as well as the associated timelines.

It is also common during these reviews to make observations regarding the effectiveness of Maintenance programs and to make recommendations for adjustments to these plans based on the observations.

When undertaking warranty reviews, the BEE must identify Building Enclosure performance issues, Building Code non-compliance, or other symptoms that may represent conditions covered by the warranty in question. However, the process of considering whether an observation, or condition, is covered by the warranty requires a full understanding of the Construction Documents, the warranty contract, applicable legislation and associated regulations, and possibly other documents. Since the BEE may neither have access to these documents, nor have the expertise to assess their impact on the potential for warranty coverage, the BEE must limit comments to the existence of symptoms, conditions, or other findings of fact, as opposed to providing opinions on the potential extent of warranty coverage.

The BEE must state the limitations in the scope or extent of the warranty review undertaken, clearly indicating that the review is limited to identifying observations, conditions, performance issues, or symptoms (e.g., visual only).

4.0 QUALITY MANAGEMENT IN PROFESSIONAL PRACTICE

4.1 QUALITY MANAGEMENT REQUIREMENTS

Engineering Professionals must adhere to the applicable quality management requirements during all phases of the work, in accordance with the Association's Bylaws. It is also important to be aware of whether additional quality management requirements exist from Authorities Having Jurisdiction or through service contracts.

To meet the intent of the quality management requirements, Engineering Professionals must establish and maintain documented quality management processes for the following activities:

- The application of relevant professional practice guidelines
- Authentication of professional documents by the application of the professional seal
- Direct Supervision of delegated professional engineering activities
- Retention of complete project documentation
- Regular, documented checks using a written quality control process
- Documented Field Reviews of engineering designs/recommendations during implementation or construction
- Where applicable, documented independent review of structural designs prior to construction

4.1.1 PROFESSIONAL PRACTICE GUIDELINES

In accordance with the *Act*, s.4(1) and Bylaw 11(e)(4)(h), Engineering Professionals are required to comply with the intent of any applicable professional practice guidelines related to the engineering work they undertake. One of the three objectives of the Association, as stated in the *Act* is “to establish, maintain, and enforce standards for the qualifications and practice of its members and licensees”. Practice guidelines are one means by which the Association fulfills this obligation.

These professional practice guidelines establish the standard of practice for Building Enclosure engineering services for building projects. Engineering Professionals who carry out these activities are required to meet the intent of these guidelines.

4.1.2 USE OF SEAL

In accordance with the *Act*, s.20(9), Engineering Professionals are required to seal all professional engineering documents they prepare or deliver in their professional capacity to others who will rely on the information contained in the documents. This applies to documents that Engineering Professionals have personally prepared and those that others have prepared under their Direct Supervision.

Failure to seal these engineering documents is a breach of the *Act*. For more information, refer to *Quality Management Guidelines – Use of Seal* (Engineers and Geoscientists BC 2017).

4.1.3 DIRECT SUPERVISION

In accordance with the *Act*, s.1(1) and 20(9), Engineering Professionals are required to directly supervise any engineering work they delegate. When working under the Direct Supervision of an Engineering Professional, unlicensed persons or non-members may assist in performing engineering work, but they may not assume responsibility for it. Engineering Professionals who are limited licensees may only directly supervise work within the scope of their license.

With regard to Direct Supervision, the Engineering Professional having overall responsibility should consider:

- the complexity of the project and the nature of the risks;
- which aspects of the work should be delegated;
- the training and experience of individuals to whom work is delegated; and
- the amount of instruction, supervision, and review required.

Careful consideration must be given to delegating Field Reviews. Due to the complex nature of Field Reviews, Engineering Professionals with overall responsibility should exercise judgment when relying on delegated field observations, and should conduct a sufficient level of review to have confidence in the quality and accuracy of the field observations. (See [Section 4.1.6 Documented Field Reviews During Implementation or Construction.](#))

For more information, refer to *Quality Management Guidelines – Direct Supervision* (Engineers and Geoscientists BC 2018a).

4.1.4 RETENTION OF PROJECT DOCUMENTATION

In accordance with Bylaw 14(b)(1), Engineering Professionals are required to establish and maintain documented quality management processes that include retaining complete project documentation for a minimum of ten (10) years after the completion of a project or ten (10) years after engineering documentation is no longer in use.

These obligations apply to Engineering Professionals in all sectors. Project documentation in this context includes documentation related to any ongoing engineering work, which may not have a discrete start and end, and may occur in any sector.

Many Engineering Professionals are employed by organizations, which ultimately own the project documentation. Engineering Professionals are considered compliant with this quality management requirement when a complete set of project documentation is retained by the organizations that employ them using means and methods that are consistent with the Association’s Bylaws and guidelines.

For more information, refer to *Quality Management Guidelines – Retention of Project Documentation* (Engineers and Geoscientists BC 2018b).

4.1.5 DOCUMENTED CHECKS OF ENGINEERING AND GEOSCIENCE WORK

In accordance with Bylaw 14(b)(2), Engineering Professionals are required to perform a documented quality checking process of engineering work, appropriate to the risk associated with that work.

Regardless of sector, Engineering Professionals must meet this quality management requirement. In this context, ‘checking’ means all professional deliverables must undergo a documented quality checking process before being finalized and delivered. This process would normally involve an internal check by another Engineering Professional within the same organization. Where an appropriate internal checker is not available, an external checker (i.e., one outside the organization)

must be engaged. Where an internal or external check has been carried out, this must be documented.

Engineering Professionals are responsible for ensuring that the checks being performed are appropriate to the level of risk. Considerations for the level of checking should include the type of document and the complexity of the subject matter and underlying conditions; quality and reliability of background information, field data, and elements at risk; and the Engineering Professional's training and experience.

For more information, refer to *Quality Management Guidelines – Documented Checks of Engineering and Geoscience Work* (Engineers and Geoscientists BC 2018c).

4.1.6 DOCUMENTED FIELD REVIEWS DURING IMPLEMENTATION OR CONSTRUCTION

In accordance with Bylaw 14(b)(3), Field Reviews are reviews conducted at the site of the construction or implementation of the engineering work. They are carried out by an Engineering Professional or a subordinate acting under the Engineering Professional's Direct Supervision (see [Section 4.1.3 Direct Supervision](#)).

Field Reviews enable the Engineering Professional to ascertain whether the construction or implementation of the work substantially complies in all material respects with the applicable engineering concepts or intent reflected in the project documents prepared for the work.

For more information, refer to *Quality Management Guidelines – Documented Field Reviews during Implementation or Construction* (Engineers and Geoscientists BC 2018d).

4.1.7 DOCUMENTED INDEPENDENT REVIEW OF STRUCTURAL DESIGNS

Bylaw 14(b)(4) refers to an independent review in the context of structural engineering. An independent review is a documented evaluation of the structural design concept, details, and documentation based on a qualitative examination of the substantially complete structural design documents, which occurs before those documents are issued for construction. It is carried out by an experienced Engineering Professional qualified to practice structural engineering, who has not been involved in preparing the design.

Often the design of Secondary Structural Elements involves a repetitive design approach to accommodate structural loads imposed by the Building Enclosure. Refer to Section 3.4.3.1 of the *Quality Management Guidelines – Documented Independent Review of Structural Designs* (Engineers and Geoscientists BC 2018e) for the independent review requirements for these types of repetitive designs. On this issue, Bylaw 14 (b)(4) expressly provides as follows: “Independent review of each instance of repetitive designs of individual structural components is not required, but documented initial independent review and independent review at intervals is required to confirm the maintenance of design quality.”

5.0 PROFESSIONAL REGISTRATION & EDUCATION, TRAINING, AND EXPERIENCE

5.1 PROFESSIONAL REGISTRATION

It is the responsibility of Engineering Professionals to determine whether they are qualified by training and/or experience to undertake and accept responsibility for carrying out Building Enclosure engineering services (Code of Ethics Principle 2).

5.2 EDUCATION, TRAINING, AND EXPERIENCE

Building Enclosure engineering services, as described in these guidelines, requires minimum levels of education, training, and experience in many overlapping areas of engineering and architecture. The Engineering Professional taking responsibility must adhere to the Association's Code of Ethics (to undertake and accept responsibility for professional assignments only when qualified by training or experience) and, therefore, must evaluate his or her qualifications and must possess the appropriate education, training, and experience to provide the services.

Appropriate qualifications for a Building Enclosure Engineer (BEE) must include core competencies which are considered basic and fundamental to the provision of Building Enclosure engineering services. These core competencies include theoretical and academic knowledge, as well as practical experience as described in these guidelines.

To achieve designs that will meet the desired performance objectives for the Building Enclosure, the BEE must also effectively translate these competencies into practice and must be aware of, and recognize, the numerous factors associated with building projects that may affect these designs.

See Sections [5.2.1 Core Competencies](#) and [5.2.2 Experience](#) below for detailed information.

5.2.1 CORE COMPETENCIES

5.2.1.1 Building Codes and Standards

The BEE must have a detailed knowledge of the applicable Building Code, standards, and Local Regulations, including the following:

- Parts 1 and 2 of Division C of the applicable Building Code, particularly with respect to application and professional design and review
- Parts 5, 9, and 10 (and 11, VBBL only) of Division B of the Building Code, particularly those sections associated with condensation control, water penetration control, and heat, air, and moisture transfer
- Parts 3 and 4 of Division B of the applicable Building Code as they apply to the Building Enclosure
- *Bulletin 34: Building Envelope Services – Appropriate Professional Practice* (AIBC and Engineers and Geoscientists BC 2011) as it relates to professional responsibilities

The BEE must have a good understanding of the relevant technical standards related to the elements of the Building Enclosure.

5.2.1.2 Theoretical and Technical Knowledge

The BEE must have a thorough understanding of the following areas of theory and technical knowledge as they relate to the performance of Building Enclosure and their specific practice:

1. Materials knowledge

- Materials' physical and chemical properties
- Mechanisms of deterioration
- Behaviour of wood, concrete, metals, plastics, gypsum, and other materials as they are used in Building Enclosure construction, including moisture transport, moisture retention or storage characteristics, and relative-movement freeze-thaw characteristics
- Determination/measurement of moisture content levels of materials used in Building Enclosure construction
- Performance thresholds and relationships between materials and environments: corrosion rates, fungal germination and growth thresholds, and decay of wood and prevention of these mechanisms of deterioration

2. Building physics

- Defining boundary conditions: interior and exterior climate and microclimate
- Impact of location, weather, and building shape on exposure to wetting and Building Enclosure design
- Moisture physics: storage and transport processes by diffusion, convection, capillary action, gravity, wind pressure, sorption relationships, and osmosis
- Use of heat, air, and moisture flow calculations, and simulation tools for Building Enclosure design and analysis
- Heat transfer: conduction, convection, radiation, and secondary modes due to latent phase changes

- Energy usage calculations and analysis, and related simulation tools
 - Mass transport and condensation: air, water vapour, and pollutants
 - Consideration of wetting, drying, storage, and material properties to prevent problematic accumulation of moisture within the Building Enclosure
 - Accommodation of thermal and moisture movements
 - Accommodation of structural loads
- ##### 3. Components, assemblies, and other building systems
- Interdependence of elements of the Building Enclosure with other building systems and functional requirements: including but not limited to environmental control systems (i.e., lighting, heating, cooling, and ventilation systems), plumbing, structure, and fire safety
 - Integration of theoretical and technical knowledge regarding materials to apply to elements that are used as part of the Building Enclosure
 - Assessment of the appropriateness of heat, air, and moisture control functions of the elements that comprise the Building Enclosure

5.2.1.3 Construction Document Preparation and Design Review

The BEE must be familiar with the content and preparation of Building Enclosure-related Construction Documents and must be able to apply his or her knowledge to the design and design review of Building Enclosures.

This competency includes but is not necessarily limited to the ability to undertake the following tasks:

- Assess exposure conditions related to the building site and determine appropriate external environmental loads, and assess internal loads imposed on the Building Enclosure due to use and occupancy

- Develop and determine appropriate Building Enclosure assemblies and select components and materials for the environmental conditions and for compatibility with adjoining materials
- Calculate heat, air, and moisture transfer through elements and assemblies in conformance with good practices (such as those described in the ASHRAE handbooks; see [Section 6.0 References and Related Documents](#)) and simulation tools
- Design and prepare detailed drawings that clearly identify the work required at various Building Enclosure locations and identify whether the designs produced by others adequately address the performance issues identified above
- Provide continuity of primary heat, air, and moisture control functional surfaces or barriers throughout the Building Enclosure

5.2.1.4 Investigation, Assessment, and Testing

The BEE must be knowledgeable about and have experience with the various techniques, standards, and protocols related to investigating, assessing, and testing Building Enclosure elements and assemblies. This competency includes being able to determine the applicability and limitations of these standards and protocols, as well as the appropriate use and calibration of testing equipment and instruments.

As a fundamental component of fieldwork, the BEE must be able to visually review the as-built construction of the Building Enclosure elements to identify the potential for Building Enclosure-related performance problems and areas at risk for water penetration, condensation, air leakage, and heat loss.

5.2.1.5 Construction Field Review

The BEE must have experience reviewing the construction of Building Enclosure elements in the field for the purpose of confirming substantial compliance with the Construction Documents and the Building Code. The BEE must be able to identify deviations from the design intent, as well as variations in site conditions from those planned or expected.

To assist in determining whether the construction of the Building Enclosure is in substantial compliance with the Construction Documents, the BEE must be able to review test results, manufacturers' product information, shop drawings, prototypes, and samples.

The BEE must be knowledgeable about contract administration responsibilities for new construction projects, as well as for Building Enclosure Rehabilitation and Renewal construction projects where the BEE may provide a broader scope of services, such as acting as payment certifier under the *Builders Lien Act*.

5.2.2 EXPERIENCE

5.2.2.1 Application of Knowledge

The BEE must have knowledge and experience relevant to the complexity of the project in the application of building science principles as they relate to the assessment of performance of the Building Enclosure.

This competency includes being able to apply informed and professional judgment where risk assessment is required, including by:

- identifying risks and the benefits of alternatives;
- assessing the consequences of the selection of alternatives, decisions, and actions;
- assessing the relative costs of various acceptable alternatives; and
- considering the application and implication of local construction practices.

5.2.2.2 Professional Qualifications

In accordance with the Association’s Code of Ethics, Engineering Professionals must restrict their practice to their fields of competence.

The Association has not implemented a specialist designation for BEEs. However, the criteria considered to be reasonable benchmarks for an Engineering Professional to practice as a BEE include:

- a minimum of five years of documented Building Enclosure experience demonstrating the core competencies listed in these guidelines;
- a minimum of two years of documented Building Enclosure experience for projects located in British Columbia or similar climatic conditions; and
- demonstrated evidence of building science education, through either
 - college or university courses,
 - programs provided by professional organizations such as Engineers and Geoscientists BC or AIBC, or by industry groups such as ASHRAE, or
 - self-study confirmed by successfully challenging exams such as the AIBC BEEP exam.

An Engineering Professional practicing as a BEE should be prepared to provide documented evidence of satisfactory qualifications and work experience, in the event that questions are ever raised about the Engineering Professional’s qualification as a BEE.

5.2.2.3 Professional Development

It is important that a BEE keep up with current knowledge and training relevant to his or her practice. A BEE must make a demonstrable effort to stay current of advances in the science and engineering practices relevant to Building Enclosure engineering, and has an obligation to do so under principle 6 of the Association’s Code of Ethics.

5.2.3 REFERENCE MATERIALS

Section 6.0 References and Related Documents provides numerous references and related materials with which a BEE should be familiar. This selection is not exhaustive, and should be considered as guidance only.

It is likely that there are other reference materials and sources that are also relevant to a BEE’s scope of practice, with which he or she should be familiar.

6.0 REFERENCES AND RELATED DOCUMENTS

Documents cited in the main guideline appear in [Section 6.1 References](#).

Related documents that may be of interest to users of these guidelines but are not formally cited elsewhere in this document appear in [Section 6.2 Related Documents](#).

6.1 REFERENCES

Architects Act [RSBC 1996], Chapter 17.

Builders Lien Act [SBC 1997], Chapter 45.

Energy Efficiency Act [RSBC 1996], Chapter 114.

Engineers and Geoscientists Act [RSBC 1996], Chapter 116.

Homeowner Protection Act [SBC 1998], Chapter 31.

Architectural Institute of British Columbia (AIBC). 2010. AIBC Document 8C – 2010 Standard Short Form Contract between Client and Consultant. Vancouver, BC: AIBC. [accessed: 2019 Jul 09].

<https://aibc.ca/resources/aibc-resources/aibc-forms-of-clientarchitect-contracts/>.

AIBC. 2007. AIBC Document 6C – 2007 Standard Form of Contract 6C Between Client and Consultant.

Vancouver, BC: AIBC. [accessed: 2019 Jul 09]. <https://aibc.ca/resources/aibc-resources/aibc-forms-of-clientarchitect-contracts/>.

AIBC and Engineers and Geoscientists BC. 2018. Joint Professional Practice Guidelines – Whole Building Energy Modelling Services. Version 1.0. Vancouver and Burnaby, BC: AIBC and Engineers and Geoscientists BC.

[accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Professional-Practice-Guidelines>.

AIBC and Engineers and Geoscientists BC. 2017. Practice Note 16: Professional Design and Field Review By Supporting Registered Professionals. Vancouver and Burnaby, BC: AIBC and Engineers and Geoscientists BC.

[accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Professional-Practice-Guidelines>.

AIBC and Engineers and Geoscientists BC. 2011. Bulletin 34: Building Envelope Services – Appropriate Professional Practice. Vancouver and Burnaby, BC: AIBC and Engineers and Geoscientists BC. [accessed: 2019 Jul 09].

<https://www.egbc.ca/Practice-Resources/Professional-Practice-Guidelines>.

Association of Consulting Engineering Companies British Columbia (ACEC-BC). 2016. User Guide to Implementing Qualifications Based Selection: Best Practices for Selecting your Design Professional (June 2016). Vancouver, BC: ACEC-BC. [accessed: 2019 Jul 09]. <https://www.acec-bc.ca/media/43176/acec-bc-user-guide-to-implementing-qbs.pdf>.

ACEC-BC. 2006. Appointing Your Consulting Engineer Using Qualifications Based Solution. Vancouver, BC: ACEC-BC. [accessed: 2019 Jul 09]. <https://www.acec-bc.ca/media/6032/OBS06.pdf>.

ACEC-BC and Engineers and Geoscientists BC. 2009. Budget Guidelines for Consulting Engineering Services. Vancouver and Burnaby, BC: ACEC-BC and Engineers and Geoscientists BC. [accessed: 2019 Oct 03]. <https://www.egbc.ca/getmedia/eced45f4-eb37-4fb2-bee9-ce5fc3288c45/ACEC-BC-Budget-Guidelines-Building-Projects-2009.pdf.aspx>.

Association of Consulting Engineering Companies Canada (ACEC). 2011. ACEC Document 32 - 2011 Agreement Between Engineer and Subconsultant. Ottawa, ON: ACEC. [accessed: 2019 Jul 09]. https://www.acec.ca/publications_media/shop/index.html/shopping/index/view-category/id/5.

ACEC. 2010. ACEC Document 31 - 2010 Engineering Agreement Between Client and Engineer. Ottawa, ON: ACEC. [accessed: 2019 Jul 09]. https://www.acec.ca/publications_media/shop/index.html/shopping/index/view-category/id/5.

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). 2018. Standard 202-2018 – Commissioning Process for Buildings and Systems. Atlanta, GA: ASHRAE.

ASTM. 2018. ASTM E2813 – Standard Practice for Building Enclosure Commissioning. West Conshohocken, PA: ASTM International.

ASTM. 2016. ASTM E2947 – Standard Guide for Building Enclosure Commissioning. West Conshohocken, PA: ASTM International.

ASTM. 2015. ASTM E2018 – Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process. West Conshohocken, PA: ASTM International.

British Columbia (BC) Office of Housing and Construction Standards. 2018. BC Building Code. [accessed: 2019 Jul 09]. <http://www.bccodes.ca>.

CMHC (Canada Mortgage and Housing Corporation). 2003. Capital Replacement Planning Manual. Ottawa, ON: CMHC. [accessed: 2019 Oct 07]. <https://www.cmhc-schl.gc.ca/en/maintaining-and-managing/managing-affordable-housing/housing-management-hub/capital-replacement-planning>.

CMHC. 2000. Research Highlights. Technical Series OO-115. Building Envelope Rehabilitation Consultant Guide and Owner/Property Manager Guide. Ottawa, ON: CMHC [Research Division].

Canadian Condominium Institute (CCI). 2019. [website]. CCI National. Resources. [accessed: 2019 07 Oct]. <https://cci.ca/resource-centre/overview>.

CSA (Canadian Standards Association). 2019. Durability In Buildings. CSA Standard S478. Toronto, ON: CSA Group.

CSA. 2016. Building Commissioning. CSA Standard Z320. Toronto, ON: CSA Group.

City of Burnaby. 2016. City of Burnaby Building By-Law 2016. Burnaby, BC: City of Burnaby. [accessed: 2019 Jul 09]. <https://www.burnaby.ca/City-Services/Building/Building-Bylaws.html?>

City of Vancouver. 2014. City of Vancouver Building By-law 2014. Vancouver, BC: City of Vancouver. [accessed: 2019 Jul 09]. <http://www.bccodes.ca/vancouver-bylaws.html>.

Engineers and Geoscientists BC. 2019. Climate. [website]. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2019 Aug 08]. <https://www.egbc.ca/Practice-Resources/Climate>.

Engineers and Geoscientists BC. 2018a. Quality Management Guidelines: Direct Supervision. Version 1.3. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Quality-Management-Guidelines>.

Engineers and Geoscientists BC. 2018b. Quality Management Guidelines: Retention of Project Documentation. Version 1.3. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Quality-Management-Guidelines>.

Engineers and Geoscientists BC. 2018c. Quality Management Guidelines: Documented Checks of Engineering and Geoscience Work. Version 1.3. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Quality-Management-Guidelines>.

Engineers and Geoscientists BC. 2018d. Quality Management Guidelines: Documented Field Reviews During Implementation or Construction. Version 1.3. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Quality-Management-Guidelines>.

Engineers and Geoscientists BC. 2018e. Quality Management Guidelines: Documented Independent Review of Structural Designs. Version 1.4. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Quality-Management-Guidelines>.

Engineers and Geoscientists BC. 2017. Quality Management Guidelines: Use of Seal. Version 2.0. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Quality-Management-Guidelines>.

Engineers and Geoscientists BC. 2016. Engineers and Geoscientists BC Position Paper – Human-Induced Climate Change. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Climate>.

Engineers and Geoscientists BC. 2014. Engineers and Geoscientists BC [formerly APEGBC] Position Paper – A Changing Climate in British Columbia. Evolving Responsibilities for APEGBC and APEGBC Registrants. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Climate>.

Engineers and Geoscientists BC. 2010. Bulletin K: BCBC – Letters of Assurance in the BC Building Code and Due Diligence. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Professional-Practice-Guidelines>.

Engineers and Geoscientists BC and AIBC. 1996. Memorandum of Agreement between The Association of Professional Engineers and Geoscientists of the Province of British Columbia and Architectural Institute of British Columbia. April 2, 1996. Burnaby and Vancouver, BC: Engineers and Geoscientists BC and AIBC. [accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Practice-Related-Agreements>.

Federation of Canadian Municipalities (FCM) and National Research Council (NRC). 2006. InfraGuide: Best Practice – Selecting a Professional Consultant. Ottawa, ON: FCM and NRC. [accessed: 2019 Jul 09]. https://www.acec-bc.ca/media/6023/DMIP_11_Selecting_a_Professional_ConsultantWEB.pdf.

Government of Alberta. 2016. Alberta Infrastructure – Guideline for Building Envelope Commissioning: New Buildings. Edmonton, AB: Government of Alberta. [accessed: 2019 Jul 09]. <http://www.infrastructure.alberta.ca/992.htm>.

National Research Council Canada (NRC). 2015a. National Building Code of Canada. Ottawa, ON: National Research Council Canada.

Province of BC. 2010. Guide to the Letters of Assurance in the BC Building Code 2006. Edition 5a (December 2010). Victoria, BC: Building & Safety Standards Branch, Ministry of Public Safety & Solicitor General. [accessed: 2019 Jul 09]. <http://www.bccodes.ca/2006GuideLoA.pdf>.

Real Estate Council of Canada. 2019. [website]. Resources. Knowledge Now. Reserve Funds/Real Estate Finance. [accessed: 2019 07 Oct]. <http://www.reic.ca/knowledge-now>.

6.2 RELATED DOCUMENTS

ASHRAE. 2019. ASHRAE Handbook – HVAC Applications [Chapter 45, Building Envelopes]. Atlanta, GA: ASHRAE.

ASHRAE. 2016. ASHRAE Standard 90.1-2016 – Energy Standard for Buildings Except Low-Rise Residential Buildings. Atlanta, GA: ASHRAE.

CMHC. 2003. Capital Replacement Planning Manual. Ottawa, ON: CMHC.

CSA. 2017. AAMA/WDMA/CSA 101/I.S.2/A440-17 North American Fenestration Standard / Specification for Windows, Doors, and Skylights. Toronto, ON: CSA Group.

Engineers and Geoscientists BC. 2015. Structural, Fire Protection and Building Envelope Professional Engineering Services for 5- and 6-Storey Wood Frame Residential Building Projects (Mid-Rise Buildings). [Technical Practice Bulletin]. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2019 Jul 09]. <https://www.egbc.ca/Practice-Resources/Professional-Practice-Guidelines>.

Garden GK. 1963. Rain Penetration and Its Control. Canadian Building Digest No. 40. Ottawa, ON: Division of Building Research, National Research Council Canada. [NRC Publications Archive].

Hutcheon NB, Handegord GOP. 1983. Building Science for a Cold Climate. Ottawa, ON: National Research Council of Canada, Division of Building Research.

Hutcheon NB. 1963. Requirements for Exterior Walls. Canadian Building Digest No. 48. Ottawa, ON: Division of Building Research, National Research Council Canada. [NRC Publications Archive].

National Research Council Canada (NRC). 2015b. National Energy Code of Canada for Buildings 2015. Ottawa, ON: National Research Council Canada.

Straube J, Burnett E. 2005. Building Science for Building Enclosures. Westford, MA: Building Science Press.

NOTES:
