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PREFACE

APEGBC introduced the Organizational Quality Management (OQM) Program in recognition of the significant influence that *organizations* have on the practice of the professions by the APEGBC professionals they employ. The OQM Program, as documented in this manual, aims to address that influence and provide guidance for professional practice *quality management* at the organizational level for professional engineering and professional geoscience. This voluntary, self-funded program is available to all *organizations* that employ professional engineers or professional geoscientists in BC and provide products or services requiring the application of professional engineering or professional geoscience. APEGBC professionals remain ultimately responsible and accountable for their engineering or geoscience work, and for carrying out that work in a manner that meets their professional obligations.

One key finding from the 2009 report of APEGBC's Professional Renewal Program was that *quality management* policies of *organizations* employing APEGBC professionals have a significant impact on the practice of the professions. In response, APEGBC established a task force of representatives from *organizations* providing engineering or geoscience related products and services in manufacturing, consulting, utilities, construction, mining, and municipal and provincial government. In 2010, this task force launched a pilot program to help *organizations* implement policies and procedures that are consistent with the *quality management* obligations that their APEGBC professionals have under the *Engineers and Geoscientists Act* and *Bylaws*. The pilot OQM Program evaluated nine *organizations* in the high tech, consulting, construction, government, manufacturing, and utilities sectors.

In December 2010, APEGBC Council approved the development of the OQM Program and the establishment of the OQM Committee. The OQM Committee reports to the APEGBC Professional Practice Committee and has responsibility for implementing the APEGBC-administered OQM Program.

In creating the OQM Program, APEGBC has **not** created a *quality management system* for *organizations*. Instead, this manual provides guidance to *organizations* on how to confirm, adapt, adopt or create policies and procedures within their *quality management system* that are consistent with the *quality management requirements* that their APEGBC professionals must meet under the *Act* and *Bylaws* that govern them. Such policies and procedures would form an important component of the *organization's* overall *quality management system*.

APEGBC will issue an OQM certificate to *organizations* that have implemented policies and procedures consistent with these requirements:

- Apply relevant APEGBC practice guidelines (Section 2)
- Retain complete project documentation (Section 3)
- Carry out documented checks of engineering and geoscience work using a written quality control process (Section 4)
- Carry out documented independent review of structural designs prior to construction (Section 5)
- Appropriately use APEGBC seals (Section 6)
- Have APEGBC professionals directly supervise engineering or geoscience work that they delegate to others (Section 7)
- Carry out documented field reviews during implementation or construction (Section 8)

As described in Section 9 of this manual, *organizations* have a number of options to implement the OQM Program and achieve OQM certification, to the benefit of their customers, the public, APEGBC professionals and the *organization*.

For your convenience, the OQM Manual provides links to all of the APEGBC Quality Management Guidelines hosted on the APEGBC web site. Figure P-1 explains the difference between the OQM Manual and the Quality Management Guidelines.

FIGURE P-1: DIFFERENTIATING OQM MANUAL AND QUALITY MANAGEMENT GUIDELINES

CATEGORIES FOR COMPARISON	OQM MANUAL	QUALITY MANAGEMENT GUIDELINES
PURPOSE	Providing resources to any <i>organization</i> wishing to support its <i>APEGBC professionals</i> by implementing policies and procedures consistent with the <i>quality management requirements</i>	Provide standard of practice for complying with the <i>quality management requirements</i>
AUDIENCE	<i>Organizations</i> that employ <i>APEGBC professionals</i>	<i>APEGBC professionals</i>
DIRECTION	Voluntary	Mandatory to follow intent
RELATIONSHIP	Collective with own terminology and all nine sections written to complement each other	Standalone documents with own definitions
CONTENT	Why and what to do with guidance about how to comply with the OQM Manual	Why and what to do, but not how to do it
OUTCOME OF USE	OQM Certification and exemption from Practice Reviews for <i>APEGBC professionals</i> employed by OQM certified <i>organizations</i>	Meeting the <i>quality management requirements</i> as stated in the <i>Act</i> and <i>Bylaws</i>
OUTCOME OF FAILURE TO USE	No OQM Certification and possible market disadvantage	Potential for disciplinary action against <i>APEGBC professionals</i>
STYLE	Informal	Formal

1.0 Why Implement OQM in Your *Organization*?

The *organization* gains better *quality management*, customer satisfaction, market recognition and improved efficiency, and also saves time, effort and money, as its *APEGBC professionals* are exempt from random selection for Practice Reviews.

We hope that you and your *organization* will choose to participate in this exciting new program from *APEGBC*. Please direct questions about the OQM Program to Kelly Dayman, Organizational Quality Management Administrator at oqm@apeg.bc.ca or 604.639.8184.

Glossary

For the purposes of this manual and the APEGBC OQM Program:

Act means the *Engineers and Geoscientists Act [RSBC 1996] c. 116*, as amended.

Active staff means those employed or hired on contract by an *organization* who directly supervise and assume professional responsibility for each area of professional engineering or professional geoscience.

APEGBC means the Association of Professional Engineers and Geoscientists of the Province of British Columbia.

APEGBC professional means professional engineers, professional geoscientists, and licensees, including limited licensees, licensed to practice by APEGBC.

APEGBC professional of record means the professional engineer, professional geoscientist or licensee, including limited licensee with the lowest level of direct professional responsibility for the engineering or geoscience work and any related engineering or geoscience documents produced, and whose seal appears on the documents; a test of "direct professional responsibility" is the ability of that *APEGBC professional* to alter or revise the engineering or geoscience content in the master documents.

Bylaws mean the *Bylaws* of APEGBC made under the *Act*.

Organization means any firm, corporation, partnership, government agency, sole proprietor or other legal entity that employs *APEGBC professionals* and provides products or services requiring the application of professional engineering or professional geoscience.

OQM organization means an *organization* that has voluntarily implemented policies and procedures consistent with the *quality management requirements* and been granted OQM certification by APEGBC.

Quality management means all the activities intended to bring about the desired level of quality which can include those related to the *quality management requirements* under the *Act* and *Bylaws*.

Quality management requirements means the *quality management* obligations required of *APEGBC professionals* under the *Act* and *Bylaws* and around which the OQM Manual and Program have been developed as listed below:

- Application of the relevant APEGBC practice guidelines – *Act*, s. 4.1(2)(b) and *Bylaw* 11(e)(4)(h) (Section 2)
- Retention of complete project documentation – *Bylaw* 14(b)(1) (Section 3)
- Documented checks using a written quality control process – *Bylaw* 14(b)(2) (Section 4)
- Documented independent review of structural designs – *Bylaw* 14(b)(4) (Section 5)
- Use of APEGBC seal – *Act*, s. 20(9) (Section 6)
- Application of direct supervision – *Act*, ss. 1(1) and 20(9) (Section 7)
- Documented field reviews of projects during implementation or construction – *Bylaw* 14(b)(3) (Section 8)

Quality management system means the organizational structure, procedures, processes and resources needed to implement *quality management*. The OQM Manual is NOT a *quality management system*. However, it does provide guidance to *organizations* about how to confirm, adapt, adopt or create policies and procedures within the *organization's quality management system* that are consistent with the *quality management requirements* the *organization's APEGBC professionals* must meet under the *Act* and *Bylaws*.

1.0 Introduction and Use of OQM Manual

Purpose of the Organizational Quality Management (OQM) Program

APEGBC professionals are employed in their professional capacity in a range of sectors including aerospace, construction, consulting, education, government (all three levels), First Nations, healthcare, heavy industry, high technology, light industry, manufacturing, marine engineering and naval architecture, natural resources, research and development, operations and utilities. No matter the sector, they are ultimately professionally responsible and accountable for the engineering or geoscience work they carry out, and for carrying out that work in a manner that meets their professional obligations.

These obligations include meeting certain overarching responsibilities under the *Act* and *Bylaws*:

- Following the standards of practice established under the authority of the *Act* which is one of the principal objects of *APEGBC*, and
- Holding paramount the safety, health and welfare of the public and protection of the environment and health and safety within the workplace as stated in the Code of Ethics *Bylaw* 14(a)(1).

To support the fulfillment of these obligations, the *Act* and *Bylaws* include *quality management* related provisions, which *APEGBC professionals* must address.

Consistent with the *APEGBC professional's* duty to be professionally responsible and accountable for his or her engineering or geoscience work, the *APEGBC professional* remains the one answerable for addressing the *quality management requirements* contained in the *Act* and *Bylaws*. These *quality management requirements* include these *quality management* obligations:

- Application of the relevant *APEGBC* practice guidelines – *Act*, s. 4.1(2)(b)
- Retention of complete project documentation – *Bylaw* 14(b)(1)
- Documented checking using a written quality control process – *Bylaw* 14(b)(2)
- Documented independent review of structural designs – *Bylaw* 14(b)(4)
- Use of *APEGBC* seal – *Act*, s. 20(9)
- Application of 'direct supervision' – *Act*, ss. 1(1), 2(6) and 20(9)
- Documented field reviews of projects during implementation or construction – *Bylaw* 14(b)(3)

These requirements are supported by the following two types of guidelines:

1. Practice guidelines, covered in Section 2 of this manual and related to the first requirement listed above, describe the appropriate level of professional practice to be met when carrying out a specific professional engineering or professional geoscience activity. These guidelines can be viewed on the *APEGBC* website at apeg.bc.ca/guidelines.
2. *Quality management* guidelines, covered in Sections 3 through 8 of this manual and related to the second through seventh requirements listed above, relate to obligatory *quality management requirements* as set out in the *Act* and *Bylaws* that apply to any engineering and geoscience work. These *quality management* guidelines can be viewed on the *APEGBC* website at apeg.bc.ca/guidelines.

To ensure that these requirements are met, an *APEGBC professional's* practice must embrace a basic level of quality assurance. *APEGBC* recognizes that quality assurance in professional practice is influenced at two fundamental levels:

1. At an individual level, through the practice of the professions by *APEGBC professionals*
2. At an organizational level, through policies and procedures implemented by *organizations* employing *APEGBC professionals* that directly impact their professional practice

APEGBC has several tools in place to address the individual level of influence on professional practice identified above. These regulatory quality assurance programs, that focus on the individual practitioner, are both

proactive (practice reviews, practice guidelines and continuing professional development) and reactive (discipline).

With the OQM Program, *APEGBC* is addressing the second level of influence on the practice of the professions identified above. Policies and procedures implemented by *organizations* have a direct impact on the practice of the *APEGBC professionals* they employ. While it is voluntary, *APEGBC* is establishing the OQM Program to influence and guide these policies and procedures, and to promote the implementation and continual improvement of professional organizational *quality management systems* within *organizations*. This program will allow *APEGBC* to more effectively deliver on its primary duty under Clause 4.1(1)(a) of the *Act*: “to uphold and protect the public interest respecting the practice of professional engineering and the practice of professional geoscience”.

The OQM Program and Manual are offered as resources to any *organization* wishing to support its *APEGBC professionals* by implementing policies and procedures consistent with the seven basic *quality management requirements* listed above. Implementing such policies and procedures does not place onus for complying with the *quality management requirements* on the *organization*. *APEGBC professionals* remain responsible for complying with the *quality management requirements* and other obligations as set out in the *Act* and *Bylaws*.

Organizations should be aware that the *Act* restricts the practice of professional engineering and professional geoscience in BC to those who are registered or licensed to practice by *APEGBC*. It also restricts the use of the titles ‘professional engineer’ and ‘professional geoscientist’ in BC to *APEGBC professionals*. In addition *organizations* in BC cannot use restricted words in the *organization’s* name (e.g., engineering, geoscience) unless they have on their *active staff APEGBC professionals* who assume responsibility for the engineering and geoscience carried out by the *organization*.

Application and Use of the OQM Program and Manual

The OQM Program is applicable to all *organizations* that employ *APEGBC professionals* and provide services and/or products requiring the application of professional engineering or professional geoscience.

Sectors in which such *organizations* are found may include:

- aerospace
- construction
- consulting
- educational
- first nations
- government
(all 3 levels and agencies)
- healthcare
- high technology
- light and heavy industry
- manufacturing
- marine engineering and
naval architecture
- natural resources
- operations
- research and development
- utilities

These obligations apply to *APEGBC professionals* in all sectors where their work in their professional capacity may apply to or be used in:

- Ongoing engineering and geoscience work
- Projects with a defined start and finish
- Products and services requiring the application of professional engineering or professional geoscience
- Engineering or geoscience deliverables including reports, drawings, specifications or other deliverables
- Implementation or use of engineering and geoscience work as may be found in a manufacturing facility, technology company, operations or utilities work
- Construction or installation of engineering or geoscience work
- Implementation or construction carried out by others

- Implementation or construction being carried out by the *APEGBC professional's organization's* own forces
- Engineering or geoscience work carried out for internal use
- Engineering or geoscience work carried out for use by others

Organizations may implement the OQM Program voluntarily by creating policies and procedures specific to the professional engineering and geoscience products and services they provide. To support their *APEGBC professionals* the policies and procedures should be consistent with the *quality management requirements* set out in the *Act* and *Bylaws*. In choosing to be an *OQM organization*, the *organization* has the following options:

- Use the policies and procedures they have already established that are consistent with the *quality management requirements*.
- Adapt the policies and procedures they have in place to be consistent with the *quality management requirements*.
- Create new policies and procedures that are consistent with the *quality management requirements*.
- Adopt the *APEGBC OQM Manual* as an umbrella policy document under which the *organization* may create standard operating procedures or other *organization-specific* documents.

What does it mean for policies and procedures to be consistent with the OQM requirements?

The following examples may help to clarify what such policies and procedures look like:

- An *organization's quality management system* may state that all required regulatory or statutory standards must be met.
 - > To be consistent with the *quality management requirements* under the *Act*, a *quality management system* would specify that *APEGBC professionals* must meet the intent of any *APEGBC practice guidelines* related to work they undertake.
- An *organization's quality management system* may state that work must be reviewed at various stages.
 - > To be consistent with the *quality management requirements*, as described in *Bylaw 14(b)4*, when undertaking structural design, a *quality management system* would specify that documented independent review of structural designs prior to construction must be conducted by *APEGBC professionals* having appropriate experience in designing structures of a similar type and scale, and not involved in preparing the design.

Structure of the OQM Manual

The OQM Manual is structured around the seven *quality management requirements* set out in the *Act* and *Bylaws*. Each section includes:

- **Purpose** – explaining the what and why of the section and linking it to its related *quality management guideline* (See Figure P-1 in the Preface for further explanation of the difference between the OQM Manual and the related *quality management guidelines*)
- **Guidance** – about what is expected of the *OQM organization* (i.e., policies and procedures consistent with the requirement)
- **Resources** – that may be used to develop policies and procedures consistent with the *quality management requirements*, including:
 - Flowcharts for processes
 - Tables for decisions
 - Checklists for reminders
 - Generic procedures
 - Other tools as appropriate

Benefits

The OQM Program will benefit *organizations* and the *APEGBC professionals* they employ by:

- Helping *APEGBC professionals* fulfill their obligations under the Code of Ethics
- Supporting *APEGBC professionals* in meeting the *quality management requirements* of the *Act* and *Bylaws*
- Fostering high standards of quality assurance in professional practice
- Improving service and deliverables to clients and customers
- Exempting *APEGBC professionals* in *OQM organizations* from random Practice Reviews
- Providing recognition for *OQM organizations*
- Promoting selection of professional engineers and professional geoscientists that includes considerations related to *quality management* of professional practice as well as other qualifications when procuring engineering or geoscience products and services
- Improving risk management
- Helping *organizations* build consistency across their operations
- Improving overall efficiency and competitiveness of the *organization*
- Providing proof of audits, quality control and corrective actions
- Making it easier to educate Engineers-in-Training (EITs) and Geoscientists-in-Training (GITs) about the *quality management requirements*

How will OQM Organizations be recognized?

To be certified by *APEGBC*, *OQM organizations* would be required to demonstrate that they have:

1. *Active staff* for each engineering or geoscience practice area in which the *organization* operates
2. Policies and procedures that are consistent with the *quality management requirements* by:
 - Using the policies and procedures they have already established that are consistent with the *quality management requirements*.
 - Adapting their policies and procedures to be consistent with the *quality management requirements* and are using them.
 - Creating new policies and procedures that are consistent with the *quality management requirements*.
 - Adopting and using the *APEGBC OQM Manual* as an umbrella policy document under which the *organization* may create standard operating procedures or other *organization*-specific documents.

Once an *organization* has demonstrated that the policies and procedures that it has in place are consistent with the *quality management requirements*, it will receive OQM certification. Details of the OQM certification process may be found in Section 9 of this manual.

Continual Improvement

APEGBC recognizes that continual improvement is fundamental to any quality program and welcomes feedback from *APEGBC professionals*, and the *organizations* that employ them about how to improve the OQM Program and Manual. As part of its commitment to the continual improvement of this program, *APEGBC* will:

- Collect input from Practice Reviews, OQM certification audits and users
- Conduct audits of the OQM Program
- Measure the OQM Program's effectiveness in improving professional practice *quality management* (e.g., discrepancies between document review and OQM certification audits)

APEGBC will report these results to the OQM Committee, which will carry out a management review of the OQM Program, at least annually, to determine where to make improvements and/or take corrective action.

OQM Committee Members

APEGBC wishes to thank the following members for their role on the OQM Committee and the development of the OQM Program and Manual:

- James Blake, P.Eng. – YVR Vancouver Airport Authority
- Greg Clarke, P.Eng. – Western Wood Truss Association of British Columbia
- Frank Huber, P.Eng. – Metro Vancouver
- Mike Knapp, P.Eng.
- Shirley McLaren, M.Sc. – Klohn Crippen Berger Ltd.
- Ferenc Pataki, P.Eng. – FortisBC
- Jon Perry, P.Eng. – Ledcor Construction Ltd.
- Jeff Pringle, P.Eng. – McElhanney Consulting Services Ltd.
- Don Shaw, P.Eng. – Government of British Columbia, Ministry of Transportation and Infrastructure
- Pat Stephenson, P.Geo., FausIMM (CP), FAIG, MCIMJ – AMC Mining Consultants (Canada) Pty Ltd.
- Ian Stewart, PhD, P.Eng. – Consulting Engineers of British Columbia
- Greg Thorne, P.Eng. – Cascade Aerospace Inc.

Copies of the OQM Manual

The OQM Manual is available on the APEGBC web site at apeg.bc.ca/oqm-manual.
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2.0 APEGBC Practice Guidelines

Purpose

APEGBC professionals are required to comply with the intent of *APEGBC* practice guidelines related to the engineering or geoscience work they undertake.

One of the three objects of *APEGBC*, 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 *APEGBC* fulfills this obligation.

Bylaw 11(e)4(h) states that registration as a member of the association shall be granted to an applicant who has satisfied all the requirements in the *Act* and submitted evidence, in the approved format, satisfactory to the council, that the applicant has demonstrated active and responsible participation in, and sufficiently broad-based competency in, or knowledge of guidelines published by *APEGBC* and relevant to the practice of the applicant.

This section of the OQM Manual provides guidance to *organizations* that want to implement policies and procedures to reinforce the use of *APEGBC* practice guidelines by the *APEGBC professionals* they employ.

Guidance

What are *APEGBC* practice guidelines?

Practice guidelines describe standards of practice and may establish the standard of care¹ to be met in a given area by an *APEGBC professional* exercising due diligence in carrying out engineering or geoscience work in that area. The guidelines:

- Specify tasks that should be performed to meet appropriate professional practice
- Outline the professional services and effort generally required to meet appropriate professional practice
- Describe the roles of those involved
- Identify the training, education and experience required, as appropriate
- Indicate the need for an appropriate level of analysis for technical recommendations
- Identify the level of detail and nature of information that should be presented
- Address the elements involved, without being prescriptive unless being prescriptive is essential for due diligence
- Identify when a peer review may be appropriate
- Support members in carrying out a particular professional activity
- Confirm what is required for professional conduct
- Reinforce *quality management requirements*

Practice guidelines are developed in collaboration with appropriate regulatory and technical bodies. They also undergo a legal review for consistency with the *Act*, *Bylaws* and Code of Ethics. Practice guidelines are periodically reviewed and updated to keep them current.

Why are practice guidelines created?

Practice guidelines may be created as a result of:

- A request or recommendation from a group of members, an *APEGBC* committee, division or task force, or government
- Issues brought to *APEGBC's* Council through practice reviews, disciplinary proceedings and industry or public feedback
- A strategic needs analysis, in response to initiatives from government, industry or the professional community

¹ Standard of care is a legal concept describing the care exercised by other reasonable, prudent and competent professionals in the same discipline at the time when and location where the work is being undertaken.

How are practice guidelines structured?

Typically practice guidelines include the following sections:

- Definitions
- Purpose and Scope
- Guidelines for Practice
- References and Related Documents

When should practice guidelines be used?

Whenever an *APEGBC professional* is performing work covered by a specific practice guideline, he or she must use that guideline to help provide services and deliverables that meet the required standard.

Why are practice guidelines important to APEGBC professionals?

Practice guidelines have been created to help *APEGBC professionals* fulfill their professional obligations. They establish a common level of expectation for clients, employers, the public at large, the profession as a whole, and government and regulatory agencies.

APEGBC professionals should be familiar with all guidelines that relate to their work. Failure to comply with the intent of a practice guideline may be considered evidence of unprofessional conduct and may result in disciplinary proceedings by *APEGBC*.

What are practice guidelines not intended to do?

Practice guidelines are not intended to replace professional judgment. They tell the *APEGBC professional* what to do, not how to do it.

Resources

A list of current *APEGBC* practice guidelines is located on the *APEGBC* website apeg.bc.ca/guidelines. The same web site lists practice guidelines available in other jurisdictions. To review current practice guidelines in another jurisdiction, visit the web site of the relevant professional association.

OQM Certification Requirements

What is the overall requirement for OQM certification?

The overall requirement for OQM certification for this section of the OQM Manual is that *organizations* explicitly require their *APEGBC professionals* to comply with *APEGBC* practice guidelines related to engineering and geoscience work they undertake.

What will the OQM auditor look for?

The OQM auditor will confirm that the *organization*:

- Communicates and reinforces this requirement
- Periodically confirms that the requirement is being met
- Can demonstrate that it has implemented policies and procedures consistent with this requirement
- Can demonstrate that its *APEGBC professionals* are in fact using, and meeting the intent of, *APEGBC* practice guidelines related to their engineering and geoscience work

3.0 Retaining Project Documentation

Purpose

APEGBC 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 or geoscience documentation is no longer in use.

These obligations apply to *APEGBC professionals* in all sectors (listed in Section 1). Project documentation, in this context, includes documentation related to any ongoing engineering or geoscience work, which may not have a discrete start and end, and may occur in any sector. (Refer to Section 1 for more detail about when and where these obligations apply in all sectors.)

Many *APEGBC professionals* are employed by *organizations*, which ultimately own the project documentation. *APEGBC 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 *APEGBC Bylaw* and *APEGBC Quality Management Guidelines – Retention of Project Documentation*.

This section of the OQM Manual provides guidance to *organizations* that want to implement policies and procedures consistent with *Bylaw 14(b)(1)* regarding retaining complete project documentation. It is intended to help *organizations* support the *APEGBC professionals* they employ so that the *APEGBC professionals* are better able to comply with the *Bylaw* and the *APEGBC Quality Management Guidelines – Retention of Project Documentation*. In addition, it will also support better customer service and risk management by *organizations*. The specific means and methods used to meet this *quality management requirement* are the prerogative of the *organization*.

Guidance

What is retaining project documentation?

Retaining project documentation means retaining any document that is evidence of engineering or geoscience-related activities, events or transactions, or is evidence that *APEGBC professionals* have met their professional and contractual obligations, or that has been prepared and delivered for the project or work, regardless of the media used to create or store the documentation.

Why retain complete documentation of engineering and geoscience work?

Retaining complete and easily retrievable documentation is critical to professional practice, and helps *APEGBC professionals* demonstrate that they are holding public safety paramount and serving the public interest as required in the *Act* and *Code of Ethics*. Documentation:

- Provides accurate records of the basis for engineering and geoscience work and decision-making
- Allows another qualified professional engineer, professional geoscientist or licensee, unfamiliar with the work or service, to pick up the file and effectively carry on with the work
- Facilitates well-run projects or work that meet objectives and professional standards
- Allows an *organization* to demonstrate that it, and its *APEGBC professionals*, have met required professional standards

Complete documentation may also be useful in resolving issues, meeting legal and regulatory requirements, documenting decision making, defending claims, undertaking future work, and making intellectual property readily retrievable for future solutions.

What constitutes an appropriate document retention system?

Figure 3-1 presents considerations for developing a document or records management system.

What documentation must be retained as a record by APEGBC professionals?

Retain documentation that is evidence of engineering or geoscience-related activities, events or transactions, or is evidence that *APEGBC professionals* have met their professional and contractual obligations. The nature of the work undertaken by an *APEGBC professional* will determine what constitutes complete documentation and depending on the sector, the list may include:

- Scopes of work to be developed
- Project or product requirements
- Budgets
- Proposals
- Feasibility studies and business cases
- Client agreements (that include compliance with *Bylaw 17* about client notification regarding professional liability insurance)
- Design or development inputs
- Records of input data reviews and/or testing
- Correspondence, including e-mail
- Drawings, specifications, reports and other professional documentation (hard copy or digital) sealed by an *APEGBC professional*
- Records of design or contract changes
- Records of checks and reviews
- Mark-ups from clients and approving authorities
- Records of approvals by clients, authorities having jurisdiction, or other stakeholders
- Calibration and testing records
- Surveys
- Field books, log books and notebooks
- Time sheets or records
- Records of procurement
- Tender, bid and contract documents
- Vendor or shop drawings
- Samples, or in their place, records of samples such as photographs or test reports
- Field review reports
- Records of resolution of any nonconforming product or services
- Any other engineering, geoscience, legal, statutory or regulatory document created for a project or work by the *organization* or others outside of the *organization*

When should documentation be retained?

Retain any documentation that is evidence of engineering or geoscience-related activities, events or transactions, or is evidence that *APEGBC professionals* have met their professional and contractual obligations, or that has been prepared and delivered for the engineering or geoscience work, regardless of the media used.

Documents and information that do not meet this definition, including duplicates, convenience copies, appointments, advertisements, and social exchanges, do not need to be retained as records and may be discarded when they are no longer useful.

How long must documentation be retained as a record?

APEGBC requires that engineering and geoscience documentation be retained for the duration of the project or work, and at least ten (10) years after the completion of a project or ten (10) years after the documentation is no longer in use.

Other regulatory, statutory or contractual obligations may require retention of certain documents for a longer period.

What should be implemented to manage documentation?

Develop an effective program for the *organization* to manage documentation, keeping it as simple as possible so that it is easily understood and adopted by users. The program should include policy, procedures, systems and training:

Policy

- Define which documentation must be retained as a record
- Capture retention periods required for various categories of documentation created or received by the *organization*, (to be comprehensive, this would typically include categories beyond those covered by the *quality management requirement*, such as accounting, payroll and legal)
- Confirm the media (electronic, hard copy or both) for retaining documentation
- Communicate rules for managing documentation within the *organization*
- Confirm roles and responsibilities for managing documentation

Procedures

For guidance on what to include and consider for procedures throughout the documentation life cycle, see Figure 3-1: Checklist of Considerations for Document and Records Management. Decide what is relevant, and keep procedures as simple as possible considering the size and complexity of the *organization*.

Decide on and use reliable systems for creating and storing documentation that are suited to the size and complexity of the *organization*.

Develop communication and training on how to manage documentation for users and for document and records managers.

How should documentation be retained?

Retained documentation may be required to substantiate or defend claims. For documentation to be used as evidence in a court of law, the means for its retention must meet the following criteria:

- **Authenticity** – be able to demonstrate, through security and access control, the origin of the documentation and the identity of those who created and revised it
- **Integrity** – be able to show that controls are in place to prevent the material content and meaning from being changed after the documentation was created
- **Accuracy** – be able to show that the documentation is correct and factual
- **Completeness** – be able to show that all parts of the original documentation are intact
- **Trustworthiness** – be able to demonstrate that the *organization's* document control and records management systems provide authentic, reliable, accurate and complete records

Retain documentation using one of three options: electronic, hard copy or a combination of both.

Designate electronic or hard copy filing as the *organization's* primary system. All documentation must then be filed and stored in the primary system. The non-primary system may contain convenience copies that can be discarded when no longer useful.

Alternatively, choose to use both electronic and hard copy filing systems, and store some types of documentation in electronic and other types of documentation in hard copy. In this instance, create a cross-reference guide between the hard copy and electronic file systems to inform users which system contains specific documentation, and where so that users can easily find the documentation they are seeking.

For ease of reference, documentation (including e-mails) should have references which are project specific and related to the subject of the document. The project name alone may not provide sufficient context for document retention purposes. The rules for references should be easy to remember and use.

Address any relevant confidentiality and security requirements when considering how documentation should be retained.

Resources

See Figure 3-1: Checklist of Considerations for Document and Records Management at the end of this section.

OQM Certification Requirements

What is the overall requirement for OQM certification?

The overall requirement for OQM certification for this section of the OQM Manual is that *organizations* have a documented process in place to retain complete project documentation for a minimum of 10 years after a project is completed or 10 years after documentation from ongoing work is no longer in use.

What will the OQM auditor look for?

The OQM auditor will confirm that:

- The *organization* has a documented process in place to manage engineering or geoscience documentation
- The process and related policies and procedures are communicated to those involved in the engineering or geoscience projects or work
- Engineering or geoscience documentation that must be retained is identified and defined
- The specified retention period for engineering and geoscience documentation is at least 10 years after a project is completed or documentation for ongoing work is no longer in use
- Engineering or geoscience project or work files are stored in a file structure that is consistent across projects or work
- The *organization* uses one of the following options for the primary filing system:
 - The *organization* uses electronic media for its primary filing system
 - The *organization* uses hard copy for its primary filing system
 - The *organization* stores some types of documents in electronic media and other types of documents in hard copy, with a cross referencing guide as to which media contains which documents
- Users are able to readily find and retrieve engineering and geoscience documentation for projects or work currently underway
- The *organization* is able to demonstrate that it retains complete engineering or geoscience documentation for a minimum of 10 years
- Retained project documentation is retrievable and legible (hard copy) or readable (electronic)
- The *organization* can demonstrate the authenticity of documents that they have created or retained (e.g., title blocks, issue/revision records, version control, check-in and out procedures, or other means)
- The *organization* can demonstrate that they have controls in place to maintain the integrity or original intent of documents they retain (e.g., revision procedure, revision records, professional seals, or other means)
- The *organization* can demonstrate that the documents they retain can be trusted (e.g., review procedures to check accuracy, completeness, correctness)
- Controls are in place for documents received by the *organization*

FIGURE 3-1: CHECKLIST OF CONSIDERATIONS FOR DOCUMENTS AND RECORDS MANAGEMENT

CONSIDERATIONS		√
PREPARING DOCUMENTS		
1	Developing document standards for consistent, professional appearance that clearly identifies the <i>organization</i> creating them	
2	Creating standard templates and forms for commonly used documents	
3	Deciding on software and media for creating and maintaining documents	
4	Developing and using standard coding or labelling for hard copies	
5	Developing and using standard file naming for electronic documents	
6	Including document identifiers (not commonly found on the document) in Document Properties or metadata stored with each electronic file	
7	Setting up a protocol for including project or work name, number and file folder in the subject line of project or work-related e-mail containing information that must be retained	
8	Creating and implementing a standard checking process appropriate to the type of document being created	
9	Training users in how to prepare documents	
FILING DOCUMENTS		
10	Creating and implementing a standard, <i>organization-wide</i> file structure	
11	Identifying primary filing system (electronic or hard copy) or deciding to use both (see item 3)	
12	If using both electronic and hard copy filing, creating a cross-reference guide showing in which system, and in which folder, documents are located	
13	For hard copy filing, labelling documents with project or work and folder name and number	
14	For electronic files, creating and using standard file naming conventions that identify project or work and file folder	
15	Filing all project or work e-mail messages that must be retained in the appropriate folder of their related project or work file structure	
16	Regularly backing up servers containing project or work filing, and storing media off-site so that the files can be restored in case of a failure or disaster	
17	Controlling access to files containing confidential or personal information	
18	Filing issued electronic documents in read-only format exactly as issued	
19	Setting up a check-in/check-out system wherever multiple users have access to working documents	
20	Training users and document managers in how to file and store documents	
REVISING DOCUMENTS		
21	Including a revision record indicating revision number, what was revised and by whom, on documents where version control is required (drawings, reports, etc.)	
22	Clearly identifying the revisions (See <i>APEGBC Quality Management Guidelines – Use of the APEGBC Seal</i>)	
23	Creating and implementing a standard checking process for all revisions	
24	Training users in document revision procedures	
ISSUING DOCUMENTS		
25	Including an issue record, indicating purpose for issuing and when issued, on documents where version control is required (drawings, reports, etc.)	
26	When issuing electronic documents, providing and retaining the file in a read-only format exactly as issued	
27	Using some form of transmittal (form, e-mail or other) as a record of what was sent to whom, when and how	
28	To create an audit trail, retaining a record of who receives which document revisions and when	

FIGURE 3-1: CHECKLIST OF CONSIDERATIONS FOR DOCUMENTS AND RECORDS MANAGEMENT

CONSIDERATIONS		√
29	Making sure the most recent or current revisions of documents are issued to those who require them	
30	Training users and document managers in how to issue documents	
RECEIVING DOCUMENTS		
31	Recording when documents are received, how and by whom	
32	Setting up a standard distribution indicating expectation of those receiving the document (e.g., approve, action by, information only, etc.)	
33	Recording actions taken based on received documents	
34	If receiving in hard copy, coding and filing in hard copy project or work file structure, or scan, name and file in electronic file structure	
35	If receiving electronic documents, naming and filing in electronic file structure or printing and filing in hard copy file structure	
36	Determining whether the document is a record to be retained or a document that is kept for convenience until no longer needed	
37	Training users and document managers in procedures for documents they receive	
ARCHIVING DOCUMENTS		
38	Defining which documents are records	
39	Creating a table to identify categories of records and their respective retention period	
40	Deciding on media for retaining records (hard copy, electronic or combination)	
41	Deciding on the means by which the integrity of the archived records is protected	
42	Culling non-records and convenience copies from files	
43	Grouping, labelling and logging records with their date of destruction	
44	Deciding on storage media (server, tapes, CDs, DVDs, hard copy, etc.)	
45	Deciding on storage location (on-site, external, etc.)	
46	Migrating or transferring records to their storage medium and location	
47	Training document managers about archiving procedures	
STORING RECORDS		
48	Setting up a system for storing records or using a qualified external provider	
49	Securing access so only those with permission can access files	
50	Limiting access to confidential and personal information	
51	Providing environmental controls to preserve records in storage (protection from moisture, fire, etc.)	
52	Migrating records to current media, or maintaining hardware and software able to access them for the duration of their retention period	
53	Training document managers in storage procedures for retained records	
DESTROYING RECORDS		
54	Destroying all records that have met all retention requirements and that are not under a legal hold for pending litigation or a regulatory requirement	
55	Keeping a record of what was destroyed, when and by whom	

4.0 Checking Engineering and Geoscience Work

Purpose

APEGBC professionals are required to establish and maintain documented *quality management* processes that include regular, documented quality checks of engineering and geoscience work appropriate to the risk associated with that work.

APEGBC professionals are employed in a range of sectors (listed in Section 1). Regardless of sector, *APEGBC professionals* are required to meet this *quality management requirement*. In this context, 'checking' means all appropriate checks of both services and products, and of both ongoing engineering or geoscience work and projects with a defined start and end. (Refer to Section 1 for more detail about when and where these obligations apply in all sectors.)

Organizations that employ *APEGBC professionals* usually develop and implement checking processes. This section of the OQM Manual provides guidance to *organizations* that want to implement policies and procedures which are consistent with *Bylaw 14(b)(2)* regarding documented checking using a written quality control process. It is intended to help *organizations* support the *APEGBC professionals* they employ, so that the *APEGBC professionals* are better able to comply with the *Bylaw* and the *APEGBC Quality Management Guidelines – Documented Checks of Engineering and Geoscience Work*. In addition, it will also support better customer service and risk management by *organizations*. The means and methods used to meet this *quality management requirement* are the prerogative of the *organization*.

Guidance

What is checking?

Checking is a documented quality control process that confirms that the work is complete, meets all input requirements, and is suited for its intended use or purpose. Checks encompass all of the various checks that occur or ought to occur throughout the development, presentation, production and performance of any professional engineering or professional geoscience work in any sector. Depending on the risk, checking may be carried out by a qualified individual independent of or associated with the work being checked or by the *APEGBC professional*, who prepared the work.

Why perform checks of engineering and geoscience work?

The *Act* and *Bylaws* require that *APEGBC professionals* must have documented checks of their engineering and geoscience work, using a written quality control process that is appropriate to the level of risk associated with the work. Checks are their means to confirm that work they have prepared meets all input requirements and the appropriate standard of care¹ expected when preparing similar work. Checks provide a second set of eyes or a second look by the *APEGBC professional*, who prepared the work, to confirm that the work is ready to be issued to those who will rely on it, or is suitable for its purpose.

What constitutes a documented checking process?

Depending on the complexity and risk associated with the engineering and geoscience work undertaken, the documented process may be a procedure, process flowchart, checklist or other guiding document that indicates what should be checked, when, by whom, how, and what supporting records are required.

The extent of checking required depends on a number of factors including:

- Complexity and risk associated with the work
- The *APEGBC professional's* experience in preparing the work
- The checker's experience in checking work of a similar nature

¹ Standard of care is a legal concept describing the care exercised by other reasonable, prudent and competent professionals in the same discipline at the time when and location where the work is being undertaken.

- The *organization's* process for conducting checks
- The applicable regulatory or statutory requirements
- The *organization's* contractual obligations
- Recommendations contained in related *APEGBC* practice guidelines
- Whether empirical or cursory analysis versus more rigorous analysis was used

What work should be checked?

Input requirements are the requirements that engineering or geoscience work being prepared must meet.

Examples include:

- Client or user objectives and requirements
- Design or implementation criteria
- Applicable codes, standards and legislation
- Organizational requirements and standards
- Related *APEGBC* practice guidelines

Identify, confirm and document input requirements before any work is carried out.

Input data is the data used as the basis for engineering and geoscience work. Examples include:

- Test and survey data
- Design or implementation assumptions
- Applicable codes, standards and legislation
- Preliminary designs or earlier reports or studies
- Work prepared by other professionals
- Information provided by the client, owner or employer

Check input data to confirm that it is current, complete, accurate, suitable and sufficient, before it is used in the work – for example, by:

- Confirming that the government or industry standard being used is the most current
- Confirming that the geotechnical report includes relevant information appropriately located for the construction
- Checking that input materials to be used in a process have been tested and certified
- Checking that a preliminary design, to be used for detailed design, has been approved by the client

Checking input data does not mean recalculating or carrying out detailed checks of work that is outside of the professional practice of the *APEGBC professional*, or that has been certified by a recognized authority. However, once input data is incorporated into the engineering or geoscience work, the *APEGBC professional of record* is confirming its suitability for his or her engineering or geoscience work.

Design software, spreadsheets or the input data they use should be validated periodically by performing a known design calculation, such as one included in a textbook exercise or confirmed in past work. Alternatively, the software can be validated against a hand calculation.

Engineering and geoscience work evolves over time and through collaboration. Periodically check the engineering and geoscience work, using appropriate types of checks, at stages or milestones suitable to the duration and complexity of the work, to see that it is complete, and meeting requirements. Make corrections and additions as needed before proceeding.

Most structural designs require an independent review. Refer to Section 5 of this manual for information about these reviews.

Concept reviews or independent reviews may be required in disciplines besides structural. Determine whether the complexity of the work, assessed risk to the public, applicable legislation, or applicable *APEGBC* practice guidelines, indicate(s) carrying out more involved or independent reviews. Carry out concept reviews or independent reviews, as required.

The *APEGBC professional*, who is taking professional responsibility for the engineering or geoscience documents that are prepared for delivery to others, must check them before sealing them. The checking is intended to confirm that the documents are complete, meet all input requirements, are suitable for their intended use, and are ready to seal, before the work is issued or put into use.

When should checking occur?

Check data and calculations that will be used as the basis for engineering or geoscience work before they are used for further development or implementation.

Periodically check the work, or carry out independent reviews, at given milestones as appropriate to the work undertaken.

Check geoscience and engineering documents prepared for delivery to others before they are sealed and issued for use, or put into use.

Who is responsible for ensuring that appropriate checks take place?

APEGBC professionals of record are responsible for ensuring that checks are performed on engineering or geoscience work that they prepare or directly supervise.

APEGBC professionals may not rely on the expectation that a client, owner, operator or regulatory authority will subsequently carry out reviews as a reason to reduce the checking of their work.

Despite the work being checked by others, the *APEGBC professional of record* remains professionally responsible for the engineering or geoscience work he or she has prepared and delivered or directly supervised.

Who is qualified to perform checks?

Checks may be performed by a professional engineer, professional geoscientist, licensee, EIT, GIT or other party who is appropriately qualified. The supervising *APEGBC professional* may be the checker. In this context, a qualified person conducting the check must:

- Have current expertise in the discipline and type of work being checked
- Be sufficiently experienced to have the required knowledge to identify the elements to be checked
- Understand the checking process
- Have reviewed and understood related requirements, and defined deliverable
- Be objective
- Be thorough and diligent in checking and recording observations

Although the person conducting the check is not assuming professional responsibility for the work, he or she will be responsible for the quality of check that he or she carries out.

When is third party or independent review appropriate?

APEGBC professionals should consider legislative requirements; the complexity of the work; elements at risk; availability, quality and reliability of background information and field data; client requirements, and their training and experience, to determine the need for third party or independent review.

When is self-checking allowed as the only means of checking work?

Unless disallowed by the *organization's quality management system*, self-checking may be used as the only check when **all** the following conditions are met:

- The *APEGBC professional* is experienced in the work being undertaken
- Work is straightforward, repetitive or uses established methods (e.g., prescriptive codes and standards requiring minimal professional judgment)
- The *APEGBC professional* considers the probability of occurrence or the magnitude of the potential result acceptable for self-checking

- Applicable *APEGBC* practice guidelines permit self-checking
- The work does not involve a structural design requiring an independent review
- The *APEGBC professional* has assessed that a self-check will meet the required standard of care for the work he or she is carrying out

Even when an independent check is used, *APEGBC professionals* must self-check their work and not rely on others to find errors and omissions.

How are checks documented and addressed?

Records of formal checks that occur throughout the project or work are a means to communicate to others that the checks have occurred, and to provide evidence that the applicable requirements have been met.

Create and retain a record of engineering and geoscience checks. Include what was checked, when and by whom. Keep a record of issues that are identified and addressed and what, if any, corrective actions were identified, approved and taken.

Follow up and track issues identified in checks, to confirm that they are addressed and that any required corrective action is taken.

Resources

A sample flowchart showing a generic checking process is shown in Figure 4-1.

Considerations for developing documented checking procedures that meet the *Bylaw* are included in Figure 4-2.

OQM Certification Requirements

What is the overall requirement for OQM certification?

The *organization* is carrying out documented checks of engineering and geoscience work, using a documented process appropriate to the risk of work undertaken.

What will the OQM auditor look for?

The OQM auditor will confirm that:

- A documented process is in place to address documented checking of engineering and geoscience work appropriate to the level of risk of work undertaken
- The documented process and related policies and procedures are communicated to those involved in the engineering or geoscience projects or work
- Input requirements for engineering and geoscience work are confirmed and recorded before work is carried out
- Input data for engineering and geoscience work is checked before the data is used in engineering or geoscience work, and a record of the check is retained
- Engineering or geoscience calculations are checked and a record of the check is kept
- Where needed or required, concept reviews or independent reviews are carried out
- Engineering and geoscience work and documentation is checked periodically, as required to suit the work, and before it is sealed and delivered, and a record of the check is kept
- Qualified checkers are performing the checks
- Controls are in place for the use of self-checks
- Records of checks include who carried out the check, when, issues of substance identified, and any resulting correction or corrective action taken

FIGURE 4-1: EXAMPLE CHECKING PROCESS USING A FLOWCHART AND CHECKLISTS

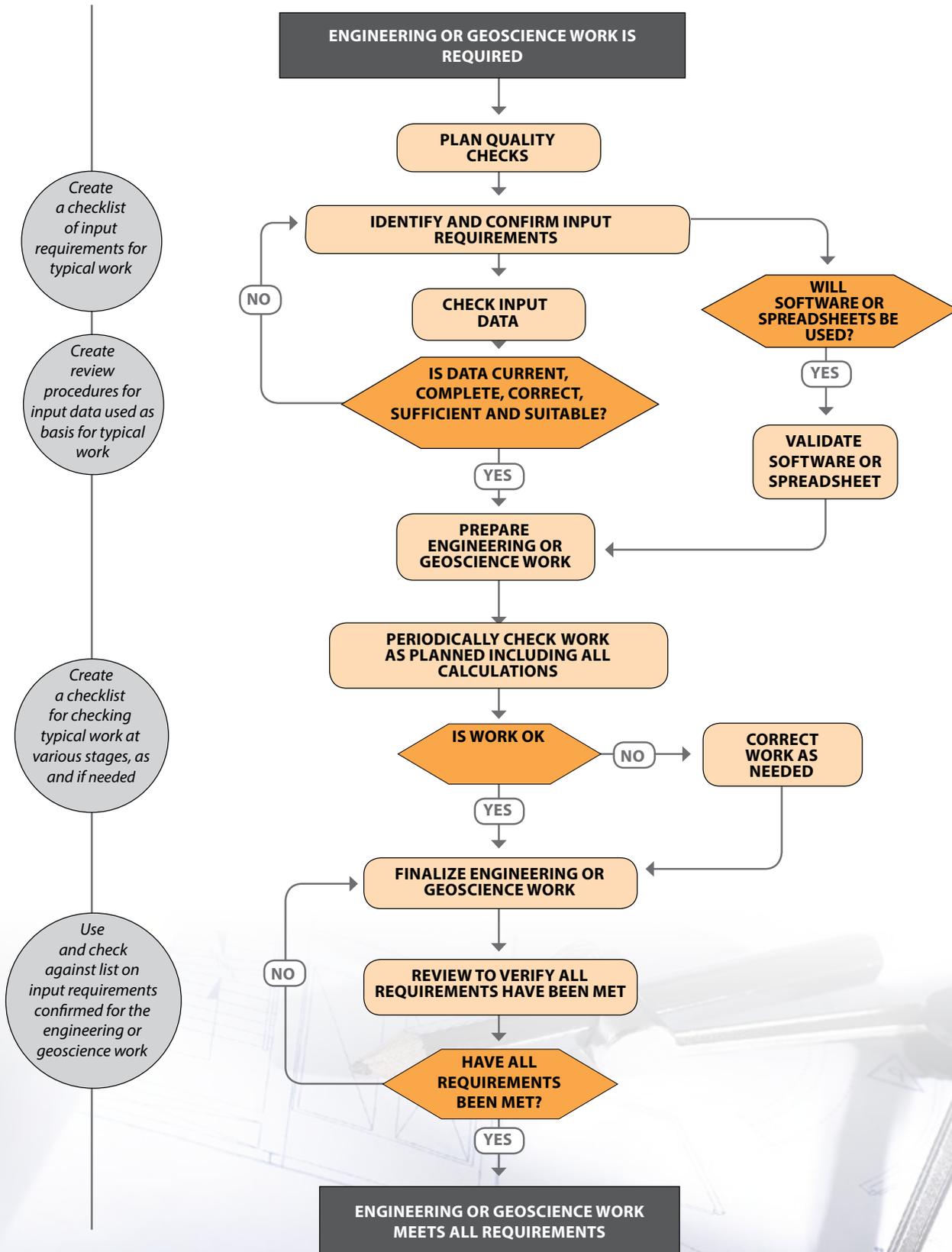


FIGURE 4-2: CHECKLIST OF CONSIDERATIONS FOR DOCUMENTED CHECKING PROCEDURES

CONSIDERATIONS		√
CAPABILITY TO PERFORM THE WORK		
1	Using resources who are qualified to perform the engineering or geoscience work	
2	Having qualified resources available to perform the work	
3	Providing adequate time and budget to perform and check work	
LEVEL OF CHECKING REQUIRED		
4	Assessing risk involved in the engineering and geoscience work	
5	Confirming complexity and duration of work	
6	Confirming any required checking procedures	
7	Determining the number, frequency and types of checks	
8	Preparing plans indicating what types of checks, when to be performed and by whom	
SELF CHECKING AS THE ONLY CHECK		
9	Setting clear policies about self-checking of engineering and geoscience work	
10	Not allowing self-checking as the only check for complex or innovative work	
11	Not allowing self-checking as the only check when the <i>APEGBC professional</i> considers the probability of occurrence and the magnitude of the potential result unacceptable for self-checking	
12	Not allowing self-checking as the only check when the required standard of care would suggest an independent check is required	
13	Not allowing self-checking as the only check when applicable <i>APEGBC</i> practice guidelines recommend or require an independent check	
14	Not allowing self-checking as the only check of structural designs that require an independent review	
15	Where self-checking is allowed, consider having self-checkers use a different means of analysis, if available, at a later time	
INPUT REQUIREMENTS		
16	Confirming input requirements such as client or user objectives and requirements, design or implementation criteria, applicable codes, standards and legislation, organizational requirements and standards, and related <i>APEGBC</i> practice guidelines	
17	Documenting input requirements	
18	Using documented input requirements on checks throughout the project or work to verify that all requirements have been met	
INPUT DATA		
19	Identifying input data such as test and survey data, design or implementation assumptions, applicable codes, standards, preliminary designs or earlier reports, investigations or studies, work prepared by other professionals, and information provided by the client, owner, operator or user	
20	Checking input data to confirm that it is current, complete, accurate, suitable and sufficient	
21	Keeping a record of input data checks	
DESIGN SOFTWARE		
22	Validating software and spreadsheets used in engineering or geoscience calculations by ensuring that they are based on current standards and periodically checking their accuracy using textbook examples, previously confirmed results or hand calculations	
23	Keeping a record or log of any software or spreadsheet validation	

FIGURE 4-2: CHECKLIST OF CONSIDERATIONS FOR DOCUMENTED CHECKING PROCEDURES

CONSIDERATIONS		√
ENGINEERING AND GEOSCIENCE WORK		
24	Confirming the types of checks required (e.g., inter-disciplinary, constructability, operability, code, and health and safety)	
25	Checking engineering and geoscience work at pre-defined stages of work	
26	Checking calculations used in engineering and geoscience work	
27	Checking and sealing engineering and geoscience work that is prepared and will be delivered to others who will use and rely on it	
28	Confirming that deliverables containing engineering and geoscience work, such as drawings, specifications, agreements, business cases, reports, and letters, are checked	
QUALIFICATIONS OF CHECKERS		
29	Having checking undertaken by an engineer, geoscientist, licensee, EIT, GIT or other appropriately qualified party who: <ul style="list-style-type: none"> • Has current expertise in the discipline and type of work being checked • Is sufficiently experienced to identify the elements to be checked • Understands the checking process • Has reviewed and understood all relevant requirements • Is objective • Is thorough and diligent in checking and recording observations 	
CHECKING TOOLS		
30	Developing checking tools such as checklists based on discipline, type of work, phase or stage of work, deliverable or product, or other content or structure suited to the work	
31	Reminding checkers that these tools do not replace their professional judgment	
32	Training provided on checking tools and procedures	
RECORDS AND FOLLOW-UP		
33	Keeping a record of checks	
34	Identifying project or work, <i>APEGBC professional of record</i> , checker, purpose of check, when checking occurred in all records, and any issues raised by the checker	
35	Documenting how the issues raised by the checker were addressed and what, if any, corrective actions were identified, approved and undertaken	
36	Tracking issues identified in checks to confirm that they are addressed and that any required corrective action has been taken	
37	Retaining a record of checks in digital or hard copy	



5.0 Independent Review of Structural Designs

Purpose

APEGBC professionals are required to establish and maintain documented *quality management* processes that include having documented independent review of structural designs they prepare, or directly supervise, carried out prior to construction by an experienced professional engineer or licensee, including limited licensee, licensed to practice structural engineering by *APEGBC*, who has not been involved in preparing the design.

APEGBC professionals are employed in a range of sectors (listed in Section 1). Regardless of the sector, *APEGBC professionals* are required to meet this *quality management requirement* when preparing structural designs.

Independent review of structural design processes are usually developed and implemented by the *organizations* that employ *APEGBC professionals*. This section of the OQM Manual provides guidance to *organizations* wishing to implement policies and procedures that are consistent with *Bylaw 14(b)(4)* regarding documented independent reviews of structural designs using a written quality control process. It is intended to help *organizations* support the *APEGBC professionals* they employ, so that the *APEGBC professionals* are better able to comply with the *Bylaw* and the *APEGBC Quality Management Guidelines – Documented Independent Review of Structural Designs* when they are preparing structural designs. In addition, it will also support better customer service and risk management by *organizations*. The means and methods used to meet this *quality management requirement* are the prerogative of the *organization*.

Guidance

What is independent review of a structural design?

Independent review is a documented evaluation of the design concept, details, and documentation, based on a qualitative examination of the substantially complete structural design documents that occurs before those documents are issued for construction. It is carried out by an experienced professional engineer or licensee, including limited licensee, licensed to practice structural engineering by *APEGBC* who has not been involved in preparing the design.

Independent review is not the same as, and is in addition to, checks of engineering and geoscience work. For information about checking, refer to Section 4 of this manual and to the *APEGBC Quality Management Guidelines – Documented Checks of Engineering and Geoscience Work*.

Why perform an independent review of structural designs?

The *Act* and *Bylaws* require that *APEGBC professionals* have documented independent reviews of their structural designs carried out before issuing structural design documents for construction. Independent reviews are the *APEGBC professional's* means of confirming that the structural design he or she has prepared meets relevant code and design requirements, and reflects the appropriate standard of care¹ expected when preparing similar work. Independent reviews have been mandated by *APEGBC* because virtually all structural designs present some risk to the public. The independent review provides an objective, independent reassessment of the adequacy of the structural design approach, execution and documentation, to reduce the risk of structural failure and the potential resulting harm to the public and the environment.

What constitutes an appropriate independent review process?

Refer to the generic procedure for independent reviews under Resources in this section of the manual.

¹ Standard of care is a legal concept describing the care exercised by other reasonable, prudent and competent professionals in the same discipline at the time when and location where the work is being undertaken

The extent and detail of independent review of structural designs will vary depending on the:

- Level of assessed risk associated with the structure
- Experience of the reviewer
- Consequences of error or incompleteness of the structural design or documentation
- Complexity of the design or structure
- Use of innovative technology
- Departure from established practices

When is independent review of structural designs required?

Except for conventional one- or two-family homes that fall under the prescriptive requirements of Part 9 of the *British Columbia Building Code*, the *Vancouver Building Bylaw* or the *National Building Code* (see “When is independent review not required?” below) all structural designs prepared in BC, in any sector, must undergo an independent review that complies with the *Bylaw* before final structural design documents are issued for construction.

Repetitive designs of individual structural components do not require an independent review of each repetition. However, an initial independent review of the typical component design, and independent reviews at intervals appropriate to confirm the performance of the design, are required.

Independent reviews may be carried out as portions of the structural design are completed. Consider carrying out the review of the concept and approach before starting the detailed design, to minimize rework. Documents may not be issued for construction, for any portion of the structure, until the independent review of that portion is completed.

When is independent review not required?

Many conventional, wood frame, one- and two-family dwellings fall entirely within the prescriptive requirements of Part 9 of the *British Columbia Building Code*, the *Vancouver Building Bylaw* or the *National Building Code*, and do not require a structural design to Part 4 of these codes. Where the structural design of a one- or two-family dwelling is based on Part 9 of the *British Columbia Building Code*, the *Vancouver Building Bylaw* or the *National Building Code* and includes an evaluation of lateral resistance conforming to *The Canadian Wood Council (CWC) Engineering Guide for Wood Frame Construction*, an independent review of the design is not required. However, where the CWC lateral resistance evaluation indicates that an engineering design conforming to Part 4 of the *British Columbia Building Code*, the *Vancouver Building Bylaw* or the *National Building Code* is required, an independent review is also required.

Who is responsible for ensuring that independent reviews take place?

The *APEGBC professional of record* is responsible for ensuring that independent reviews are performed on structural designs that he or she prepares, or that have been carried out under his or her direct supervision.

Despite the work being reviewed by others, the *APEGBC professional of record* remains responsible for the structural design work he or she has carried out in his or her professional capacity, or under his or her direct supervision.

The *APEGBC professional of record* for the primary structural system for a structure is not responsible for ensuring that independent reviews are carried out on all individual structural components designed by other *APEGBC professionals* retained by the component manufacturer and incorporated into the primary structural system. However, the *APEGBC professional of record* for the primary structural system is responsible for confirming that the components are in general conformance with the design concept and general arrangement of the primary structural system.

Who is qualified to perform independent reviews of structural designs?

To be qualified, a reviewer must be a professional engineer or licensee, including limited licensee, licensed to practice structural engineering by *APEGBC* and:

- Must have appropriate experience with the type of structure being reviewed

- Must have sufficient experience to critique concepts and identify deficiencies in structures with a complexity equal to or greater than that being reviewed
- Should have a recommended minimum of 6 years experience with particular structural system being reviewed
- Must not have been involved in preparing the design

Can the independent reviewer be the checker?

Checking is a different process and a distinct activity from independent review. If qualified to do so, the independent reviewer for the structural design may also perform required checking as described in Section 4 of this manual.

How are independent reviews documented?

The independent reviewer must communicate the results of the review to the *APEGBC professional of record* and document the results. Records of calculations, check prints, and communication concerning the review and any concerns raised, must be retained as records with other project documentation. (Refer to the Checklist and Signoff for Independent Review, included under Resources at the end of this section, for an example of an appropriate record.)

Resources

Generic Procedure for Independent Review

To avoid surprises later in the design evolution, independent review may be carried out periodically throughout the design, with the final review based on the substantially complete structural design documents. The focus of the review should be the initial assumptions, design criteria, appropriateness of the proposed concept, and the final design solution.

Role of the APEGBC Professional of Record

The *APEGBC professional of record* will provide the following documents to the independent reviewer:

- Structural plans and supporting documents, plus plans and supporting documents of other disciplines that may be necessary to review the structural design, or as otherwise requested by the reviewer.
- The structural specifications, plus specifications of other disciplines that may be necessary to review the structure, or as otherwise requested by the reviewer.
- All geotechnical reports and any follow-up documentation between the *APEGBC professional of record* and the geotechnical engineer.
- If it is not incorporated in the drawings and specifications, a summary sheet documenting:
 - The structural system and design approach, in sufficient detail to identify the lateral and vertical load resisting systems, including any special or unconventional aspects
 - Site-specific design data including climatic and seismic criteria
 - Project or work-specific design data, including seismic parameters, soil bearing capacity, lateral soil pressure, pile capacity, etc.
 - The design loads from use and occupancy, snow, rain, wind, superimposed dead loads, mechanical and electrical equipment, and architectural features such as cladding, window-washing equipment and landscaping
 - Any special loading conditions or performance criteria
- Structural design notes and calculations, when requested by the reviewer.

Role of the Independent Reviewer

The independent reviewer will carry out the independent review as follows:

- Review the design criteria, loads, including loads imposed by components designed by other disciplines and loads from adjacent structures, and performance requirements.
- Review geotechnical requirements and material properties.
- Review the concept and integrity of the gravity and lateral load-resisting systems.
- Review the continuity of load paths for both gravity and lateral loads.
- Review the structural plans and supporting documents to determine whether they are sufficient to identify the essential components of the structural system, and provide sufficient information to guide the construction of the structure.

- Where appropriate, perform design calculations on a representative sample of structural elements, to determine whether the analysis, design and detailing generally comply with the appropriate codes and standards.
- Discuss any concerns with the *APEGBC professional of record*. It is the responsibility of the *APEGBC professional of record* to adequately resolve concerns noted in the independent review.
- Provide a formal record of the independent review to the *APEGBC professional of record*, highlighting any concerns (see the Checklist and Signoff for Independent Review included in this section).
- If significant concerns are noted, request that the design be revised and resubmitted.

Generic Form

- Checklist and Signoff for Independent Review (included at the end of this Section)

OQM Certification Requirements

What is the overall requirement for OQM certification?

APEGBC professionals in the *organization* are having independent review of structural designs that they prepare or directly supervise carried out as required to meet the *Bylaw* and related Quality Management Guideline.

What will the OQM auditor look for?

This section is only applicable where the *organization* prepares structural designs that require independent review as described in this section.

The OQM auditor will confirm that:

- The *organization* has a documented process in place to conduct independent review of structural designs
- Process and related policies and procedures are communicated to those involved in structural design
- The level of detail and extent of reviews are based on the assessed risk
- The *organization* can demonstrate that independent review of structural designs is taking place before documents are issued for construction
- Where the *organization* designs repetitive structures, the *organization* can demonstrate that independent review, of the initial design and at appropriate intervals to confirm performance, is taking place
- *APEGBC professionals*, responsible for primary structural systems, are confirming that specialty components designed by others are in general conformance with the design concept and general arrangement of the primary system
- Independent reviewers are appropriately qualified to perform the independent reviews they carry out and have not been involved in preparing the related design
- Documentation provided by the *APEGBC professional of record* to the independent reviewer is as required by the *APEGBC Quality Management Guidelines – Documented Independent Review of Structural Designs*
- Independent reviews include:
 - design criteria, loads, including loads imposed by components designed by other disciplines and loads from adjacent structures, and performance requirements
 - geotechnical requirements and material properties
 - concept and integrity of the gravity and lateral load resisting system
 - continuity of load paths for both gravity and lateral loads
 - structural plans and supporting documents, to determine whether they are sufficient to identify the essential components of the structural system, and provide sufficient information to guide the construction of the structure
 - where appropriate, performing design calculations on a representative sample of structural elements to determine whether the analysis, design and detailing generally comply with the appropriate codes and standards
- Independent reviewers are discussing any concerns with *APEGBC professionals of record*
- Independent reviewers are providing a formal record of the independent reviews to the *APEGBC professional of record*, highlighting any concerns
- Where independent reviewers note significant concerns, they are requesting that the *APEGBC professional of record* revise and resubmit the design documents for independent review
- *APEGBC professionals of record* are adequately resolving concerns noted in the independent reviews, and documenting the rationale for their actions
- Adequate records of independent reviews and resulting actions are being retained

CHECKLIST AND SIGNOFF FOR INDEPENDENT REVIEW

APEGBC Professional of Record

RE: _____
 Name of Project or Work (print) P.Eng. or Licensee name (print)

 Address of Project or Work (print) Firm name (print)

 Legal Description of Project or Work (print) Address (print)

ITEM	REVIEWED	REMARKS
	INITIALS	
1. Design code loadings and serviceability limits.		
2. Material specifications and geotechnical recommendations.		
3. Concept and integrity of the gravity load resisting system.		
4. Concept and integrity of the lateral load resisting system.		
5. Drawing completeness and continuity of load paths.		
6. Design check of representative structural elements.		
7. Review of representative structural details.		
8. Concerns with the APEGBC Professional of Record.		

Independent Reviewer

 P.Eng. or Licensee name (print)

 Firm Name (print)

 Address (print)

 Date (yy/mm/dd)

 Signature

CHECKLIST AND SIGNOFF FOR INDEPENDENT REVIEW

To: **APEGBC PROFESSIONAL OF RECORD**

Date: _____

P.Eng. or Licensee Name (print)

Firm Name (print)

Address (print)

RE:

Project Name (print)

Address of Project (print)

Legal Description of Project (print)

The undersigned hereby records that an independent review of the project or work, based on the attached list of the structural plans and supporting documents prepared by the *APEGBC professional of record* for the structural components, has been completed by this independent reviewer.

I certify that I am an *APEGBC professional* as defined below.

Name (print)

Date: _____

Signed (print)

Address (print)

Phone

(Affix PROFESSIONAL SEAL here)

(If the independent reviewer is a member of a firm, complete the following.)

I am a member of the firm _____ and I sign this letter
on behalf of the firm. (print name of firm)

NOTE:

1. The above letter must be signed by an *APEGBC professional* (professional engineers, licensees, including limited licensees, licensed to practice by *APEGBC*) qualified to conduct an independent review on the structural design being reviewed.
2. This letter is endorsed by *APEGBC*.

6.0 Use of APEGBC Seal

Purpose

APEGBC professionals are required to seal all professional engineering or professional geoscience documents, that have been prepared by them or have been prepared under their direct supervision, and that will be delivered to others who will rely on the information contained in the documents.

APEGBC professionals are employed in their professional capacity in a range of sectors (listed in Section 1). Failure to seal engineering or geoscience documents that they prepare and deliver in their professional capacity or have prepared and delivered under their direct supervision in any sector is a breach of the *Act*. (Refer to Section 1 for more detail about when and where these obligations apply in all sectors.)

Processes to manage and control document preparation and the use of seals are usually developed and implemented by the organizations that employ *APEGBC professionals*. This section of the OQM Manual provides guidance to organizations that want to implement policies and procedures which are consistent with the *Act* regarding the use of *APEGBC* seals. It is intended to help organizations support the *APEGBC professionals* they employ, so that the *APEGBC professionals* are better able to comply with the *Act* and the *APEGBC Quality Management Guidelines - Use of the APEGBC Seal* when using their seal. In addition, it will also support better customer service and risk management by organizations. The means and methods used to meet this *quality management requirement* are the prerogative of the organization.

Guidance

What is meant by sealing a document?

The purpose of the *APEGBC* seal is to authenticate engineering and geoscience documents. When signed and dated, an *APEGBC professional's* seal indicates to the user of the document that the sealed document has been prepared and delivered in the professional capacity of, or directly supervised by, a qualified *APEGBC professional*, who is taking full responsibility for the contents of the document. The seal indicates that the document has not been altered, and that it contains the original information for which the *APEGBC professional* accepted responsibility. The seal is a mark of reliance, an indication that others can rely on the fact that the opinions, judgments, or designs in the sealed documents were provided by an *APEGBC professional* held to high standards of knowledge, skill and ethical conduct. It is not a warranty.

The seal may be a rubber stamp that uses ink to leave its mark or an electronic image of a seal accompanied by a digital certificate. A document is sealed when the seal is applied, signed, and dated, by the *APEGBC professional* whose name is on the seal.

Why seal professional documents?

APEGBC professionals are required by the *Act* to seal all documents prepared and delivered in their professional capacity or prepared and delivered under their direct supervision. In applying their seal on a document *APEGBC professionals* are making a visible commitment to the standards of the professions and signifying to the public that they accept professional responsibility for the document and its content.

What constitutes an appropriate system to manage the use of seals?

Refer to the considerations and resources provided under Resources later in this section.

Which documents should be sealed?

When *APEGBC professionals* act in their professional capacity to prepare and deliver a document, which contains information involving the practice of professional engineering or professional geoscience, or when they directly supervise the preparation and delivery of such a document, they are required to apply their *APEGBC* seal. *APEGBC professionals* should do so only after they have evaluated, and are ready to accept responsibility for, the document and its contents.

Professional documentation is any document in hard copy or digital format, including reports, letters, certificates, design briefs, memos, field memos, e-mails, specifications, drawings, maps, plans, and some shop drawings, that provides recommendations, designs, directions, estimates, calculations, opinions, interpretations or observations on engineering or geoscience technical subjects.

In addition to the *Act*, certain other legislation, such as *Occupational Health and Safety Regulations*, *BC Building Code* and the *Safety Authority Act*, requires *APEGBC professionals* to seal engineering and geoscience documents relevant to the professional activity they are carrying out. *APEGBC professionals* must have current knowledge of any applicable legislation that contains a requirement to seal.

Where manufactured equipment, products or components are specified for use or installation in BC, and they have been designed and fabricated outside of BC, an *APEGBC professional* is not required to seal fabrication or vendor documents for these items provided that they have been certified by the fabricator as meeting the performance specification prepared and sealed by that *APEGBC professional*. However, *APEGBC professionals* are responsible for checking and sealing documents showing that the equipment meets BC *Occupational Health and Safety Regulations* and BC Safety Authority requirements. *APEGBC professionals* are also responsible for preparing and sealing any documents for on-site services required for any equipment.

Out-of-province manufactured or fabricated components, such as pre-engineered steel buildings or wood trusses, will continue to require the seal of an *APEGBC professional*. In addition, other legislation in BC may require the seal of an *APEGBC professional* on specific manufactured or fabricated products for use or installation in BC that have been designed and constructed/fabricated outside of BC.

APEGBC professionals must not seal documentation that has not been prepared in their professional capacity (i.e., does not contain engineering or geoscience content).

***APEGBC professionals* are professionally responsible for any aspect of a project, work or document that they have prepared and delivered or directly supervised, whether or not they apply their seal.**

For more detail about whether a document should be sealed or not, refer to Figure 6-4.

When should a seal be applied?

The test of whether or not a document is required to be sealed is: Will those receiving the document(s) be relying on the engineering or geoscience content of the document or is it being issued for information only?

- If it will be relied on whether for tendering, permitting, construction, implementation, use or other reliance, the *APEGBC professional* must seal the document(s).
- If it is for information only, discussion purposes, collaboration or not in its final form and the receiver will understand that they cannot rely on it to price, construct, install, implement or use, the *APEGBC professional* does not need to seal the document(s).

A seal may only be applied when the *APEGBC professional* is ready to accept professional responsibility for the document and its engineering or geoscience contents. It must, however, be applied before any engineering or geoscience document is delivered to others who will rely on that document. Typically, an *APEGBC professional* prepares the document or has it prepared, reviews it, and takes professional responsibility for its contents, before deciding to seal it and deliver it to those who will use or rely on it.

APEGBC professionals must never acquiesce to others, including clients, owners or employers when deciding whether a document is ready to seal. A decision to seal or not seal an engineering or geoscience document must always be made by the *APEGBC professional* responsible for that document and its contents.

Who can seal a professional document?

APEGBC professionals must seal professional engineering or professional geoscience documents for projects or works to be constructed or implemented in BC. A seal may only be signed and dated by the *APEGBC professional* whose name is on the seal. No one else is allowed to sign for the *APEGBC professional*, and a seal must never be applied without his or her permission. The seal must remain in the secure care and control of the *APEGBC professional* to whom it is issued.

Limited licensees may only seal documents within the scope of practice defined by their license.

What to do when asked for a copy of an originally sealed document?

Where an unsealed copy of the document satisfies a request for a copy, the copy need not be originally sealed. The record copy of the document as issued on file will include the original seal.

If an electronic copy containing the *APEGBC professional's* seal is to be transmitted, controls must be in place to prevent alteration of the document after the seal is applied, and to prevent misuse of the applied seal. A notation should be added to an electronically transmitted copy of an originally sealed document, indicating that the content of the document can be confirmed by referring to the originally sealed and signed version at the *APEGBC professional's* office. Suggested wording for this notation appears in the *APEGBC Quality Management Guidelines – Use of the APEGBC Seal*.

What to do when asked to seal record drawings?

Record drawings include as-constructed or as-implemented measurements taken of completed works. Record drawings prepared for clients, owners or employers may also include engineering or geoscience changes made and approved during construction or implementation, changes necessitated by differing site conditions, or addenda not previously incorporated into the documents during the tendering process that would be included on final design drawings. The as-constructed or as-implemented measurements may be taken by someone under the direct supervision of the *APEGBC professional of record* or they may be supplied by others such as the contractor, operations manager or others, responsible for the construction or implementation, who are not under the *APEGBC professional's* direct supervision. Clients, owners or employers may require that one set of record drawings containing the design changes and as-constructed or as-implemented information be provided and sealed. *APEGBC professionals* are not permitted to take responsibility for field measurements that were not carried out under their direct supervision. *APEGBC professionals* may only seal documents that also contain as-constructed or as-implemented information provided by others not under their direct supervision when an appropriate declaration is included to indicate that they are not accepting responsibility for the information supplied by others.

Organizations may seek advice from their legal or insurance advisors as to appropriate wording for a declaration, or use the declaration wording included in the *APEGBC Quality Management Guidelines – Use of the APEGBC Seal*.

What to consider when sending professional information by e-mail?

To authenticate technical engineering or geoscience opinions and decisions, on which others will rely, that is to be sent in the body of an e-mail message, an appropriate approach is to follow up such transmissions by preparing a document that can be authenticated and formally transmitted.

Options for Providing CADD Files to a Client

Clients, owners or authorities having jurisdiction may request editable CADD files for use to maintain their facilities, or in the case of municipalities, to publish for use by others. To seal and authenticate their work, and distinguish it from future changes to the drawings made by the receivers of such files, *APEGBC professionals* may:

- Seal the CADD files using an electronic seal and digital certification technology that meets the *APEGBC Best Practices* (see Figure 6-2). Future revisions made by others to the CADD drawing files will be clearly distinguished from the files as they were when sealed, or
- Seal a hard copy version of the drawings and deliver it along with a set of editable CADD files that have not been sealed, or
- Scan a sealed set of the drawings and deliver it along with a set of editable CADD files that have not been sealed.

What to consider when professional documents must be translated?

APEGBC professionals may not seal documents in languages other than their working language(s). *Non-APEGBC professionals* may not translate engineering and geoscience documents as this is the practice of professional engineering or professional geoscience. Thus *APEGBC professionals* may not seal documents translated by a *non-APEGBC professional*.

How should the seal be applied?

Place the seal prominently on the document. For more information about where to apply the seal to various types of documents, refer to Figure 6-1.

Sign and date the seal. The seal is not complete without the *APEGBC professional's* signature and the date the seal is being applied. No one else may sign an *APEGBC professional's* seal on his or her behalf.

When using a rubber stamp to seal a hard copy document, make sure the impression is clear and legible. Preferably, sign and indicate the date adjacent to or across the seal in ink of a different colour than the ink used for the seal.

When using electronic seals with digital certification technology, the following options are available for applying an electronic version of the seal and validating it with certification technology:

1. Purchase an electronic version of the seal from *APEGBC* and use an *APEGBC*-endorsed digital certificate service provider such as Notarius, Inc.
2. Purchase or create an electronic version of the seal that replicates the rubber stamp version, choose a digital certificate service provider, and have an independent consultant confirm to *APEGBC* that the provider meets *APEGBC* best practices (see Figure 6-2 for the *APEGBC* Best Practices for Digital Certificate Technology)
3. Purchase an electronic version of the seal from *APEGBC* and choose a digital certificate service provider that has **NOT** been independently confirmed to meet the *APEGBC* best practices.

However, if an *APEGBC professional* chooses option 3, *APEGBC* will not be able to confirm to those receiving such documents electronically that they have an appropriate level of security, protection of document integrity, and proof of authenticity, that are equivalent to a hard copy document sealed with the *APEGBC professional's* wet ink stamp with handwritten signature and date.

APEGBC does not approve the use of stick-on, photocopied or electronically scanned and applied versions of a seal or signature, or the insertion of electronic seals without a digital certificate into electronic files being distributed as such to others.

Legal Requirements for Electronic Seals

APEGBC professionals:

- Must use an electronic seal issued by *APEGBC*, or
- Alternatively, they may have an electronic replica of their seal created, but must use it with a digital certificate technology provided by Notarius or another service provider that has been independently confirmed to meet *APEGBC* best practices (refer to Figure 6-2 for *APEGBC* Best Practices for Digital Certificate Technology).

The seal must bear the engineer's, geoscientist's, or licensee's name, as well as the words "Professional Engineer, Province of British Columbia", "Professional Geoscientists, Province of British Columbia" or "Limited Licensee" respectively. When applied with a digital certificate, it must include the date that the *APEGBC professional* sealed the document.

The electronic seal must be capable of being "returned" to *APEGBC*, that is, an *APEGBC professional* must be able to show *APEGBC* that he or she is no longer able to use the electronic seal.

What records must be retained?

APEGBC professionals or their organizations are required to retain all originally sealed documents issued to others.

RESOURCES

Managing the use of seals within an organization

Organizations should put in place a system to control the use and prevent the misuse of *APEGBC* seals within the *organization*, reflecting the following considerations:

- Be aware that:
 - *APEGBC* owns the *APEGBC professional's* seal and can require it to be returned to *APEGBC* where serious issues of misuse have been identified
 - The seal must remain in the care and control of the *APEGBC professional* to whom it was issued
 - No one else can sign the seal on behalf of the *APEGBC professional*
- Understand when *APEGBC professionals* must seal documents that they prepare and deliver
- Understand that the *APEGBC professional* affixing his or her seal to an engineering or geoscience document is the one having the lowest level of direct professional responsibility for the document
- Do not allow anyone to interfere with an *APEGBC professional's* judgment about when to apply or not apply his or her seal
- Communicate to all employees involved in document production about how, when and by whom professional seals may be applied
- Take appropriate action when misuse of professional seals occurs
- With increasing use of digital documents, consider implementing digital certification technology that meets *APEGBC* best practices, such as that provided by Notarius, Inc. (See Figure 6-2 for the *APEGBC* best practices.)

Use the following resources to assist *APEGBC professionals* in appropriately applying their seals:

- Figure 6-1: Where to Apply Seals
- Figure 6-2: *APEGBC* Best Practices for Digital Certificate Technology
- Figure 6-3: Practical Methods for Issuing Sealed Documents
- Figure 6-4: When to Apply Seals

FIGURE 6-1: WHERE TO APPLY SEALS

TYPE OF DOCUMENT	LOCATION
DRAWINGS	In allotted space in title block or in lower right corner of each drawing
SPECIFICATIONS	On first page or cover sheet of section to which the seal applies or, if responsible for overall specification bound in a booklet, on the booklet's cover sheet
REPORTS	Next to the title of the author or signature in the report, whether at the beginning or end of the report
OTHER PROFESSIONAL DOCUMENTS	Next to the title of the author or signature, whether at the beginning or end of the document
DIGITAL FILES	Use an electronic seal only in combination with digital certification technology, in a location appropriate to the type of document

FIGURE 6-2: APEGBC BEST PRACTICES FOR DIGITAL CERTIFICATION TECHNOLOGY

For APEGBC to confirm the integrity, security and authenticity of a transmitted document when an electronic image of a seal is used with digital certification technology, the digital certificate service provider must apply a digital certificate which has been independently verified as meeting the following best practices¹:

- Provide a seal that bears the engineer's, geoscientist's, or licensee's name, and words "Professional Engineer, Province of British Columbia", "Professional Geoscientist, Province of British Columbia" or "Limited Licensee" respectively.
- Be experienced in providing this technology to members and licensees of other professional associations.
- Have the resources, technical support and systems in place to provide continuity of service for years to come.
- Have protocols consistent with APEGBC's authority to regulate the use of the APEGBC professional's seal, by allowing APEGBC to revoke or suspend the APEGBC professional's ability to use their seal.
- Have protocols consistent with APEGBC's need to ensure that only an APEGBC professional is granted the authority to own and use an electronically applied seal with his or her personalized digital certificate.
- Have a platform that offers flexibility and ease of use for a wide range of purposes and applications (e.g. compatible with different file formats, ability to seal, sign and date multiple sets of engineering/geoscience documents in a single operation).
- Have digital certificate technology that is compatible with that used by members of the Architectural Institute of BC.
- Use a Public Key Infrastructure which is a combination of hardware, software, people, policies and procedures needed to create, manage, distribute, use, store, and revoke digital signatures.
- Have a digital certificate that is compliant with the International Telecommunications Union X509v3 standard.
- Maintain the digital certificate under the sole control and possession of the APEGBC professional.
- Allow the digital certificate to be stored on the media of the APEGBC professional's choice (i.e. hard drive, memory stick).
- Provide interfaces between the technology and the software used by APEGBC professionals so the image of the APEGBC professional seal, with signature and date, appears when printing the document.

FIGURE 6-3: PRACTICAL METHODS FOR ISSUING SEALED DOCUMENTS

Here are some practical ways APEGBC professionals can comply with the *quality management requirement* and issue documents that require sealing:

HARD COPY DOCUMENTS

- Print the document(s), apply the seal to the hard copy document(s), sign and date the seal, and issue the hard copy document(s). A record sealed set should be retained by the APEGBC professional. This method may be impractical for issuing a large number of sets.
- Print the document(s) to Mylar or other reproducible material, apply the seal to the Mylar or original, sign and date the seal, reproduce multiple hard copies, as needed, and issue the copies of the document(s). The APEGBC professional does not need to originally seal the copies. A record sealed set should be retained by the APEGBC professional.
- Apply an electronic version of the seal to the document files, print the document(s) to mylar or other reproducible material, sign and date the seal on each Mylar or original, reproduce multiple hard copies, as needed, and issue the copies of the document(s). Remove the electronic seal from working document files. The APEGBC professional does not need to originally seal the copies. A record sealed set should be retained by the APEGBC professional.

ELECTRONICALLY ISSUED DOCUMENTS

- Apply an electronic image of the seal to the file with digital certification that meets APEGBC best practices and transmit the file to others. A record sealed set should be retained by the APEGBC professional.
- Print the document(s) to Mylar or other reproducible material, apply the seal to the Mylar or original, sign and date the seal, scan the hard copy originally sealed document(s) and issue the file created electronically. A record sealed set should be retained by the APEGBC professional.
- Have a digital certificate that is compliant with the International Telecommunications Union X509v3 standard.
- Maintain the digital certificate under the sole control and possession of the APEGBC professional.
- Allow the digital certificate to be stored on the media of the APEGBC professional's choice (i.e. hard drive, memory stick).
- Provide interfaces between the technology and the software used by APEGBC professionals so the image of the APEGBC professional seal, with signature and date, appears when printing the document.

¹ APEGBC will only endorse those digital certificate service providers that are confirmed by an independent consultant to have met the APEGBC best practices.

OQM Certification Requirements

What is the overall requirement for OQM certification?

APEGBC professionals employed by the *organization* are sealing all engineering or geoscience documents prepared by them or prepared under their *direct supervision* before the documents are delivered to others who will rely on the information contained in them.

What will the OQM auditor look for?

The OQM auditor will confirm that:

- The *organization* has policies and procedures in place for managing the use of seals.
- Policies and procedures are documented and communicated to those involved in document preparation.
- Documents that require sealing are being sealed by *APEGBC professionals* acting in their professional capacity or directly supervising the work contained in the documents.
- Documents are being sealed by the *APEGBC professional* with the lowest level of direct professional responsibility for the work (*see definition of APEGBC professional of record*).
- Documents are being sealed, signed and dated in an appropriate location.
- Decisions about when to seal documents are being made by the *APEGBC professional of record*.
- Before sealing a document, the *APEGBC professional of record* is reviewing the document and accepting professional responsibility for its content.
- Master documents that can be altered and reproduced are NOT being sealed.
- Type of seal used in *organization*:
 - Hard copies of documents are sealed using ink seals, signatures and dates.
 - Digital copies of documents are sealed with an electronic version of the seal and a digital certificate to validate the electronic seal.
- Applied scans of seals, stick on seals, electronic seals not validated by a digital certificate in an editable file, and other unapproved versions of seals are not being used.
- Where electronic seals are being used, they have been purchased from *APEGBC*, or an electronic replica of their seal has been created and is used with a digital certificate technology provided by Notarius or another service provider where there is independent confirmation that the *APEGBC* best practices (*see Figure 6-2*) have been met.
- Where digital certificates are being used, the service provider has been independently confirmed to meet the *APEGBC* best practices, or is sanctioned by *APEGBC*.
- Record drawings that include design changes and as-constructed or as-implemented information supplied by others are being sealed only when a suitable declaration has been included on the drawing.
- Engineering and geoscience opinions or decisions sent in the body of e-mails is followed up with a sealed document.
- *APEGBC professionals* are sealing only documents prepared in languages in which they are fluent.
- Sealed documents (whether hard copy and digital) are retained as records.

FIGURE 6-4: WHEN TO APPLY SEALS

STAGE OR TYPE OF DOCUMENT	INTERNALLY ISSUED CONCEPTUAL OR PRELIMINARY DOCUMENTS (not intended or ready to be relied upon by others) for use solely within the entity in which it was created such as a company, government ministry or an engineering or geoscience office or department.	EXTERNALLY ISSUED OR FORMALLY PREPARED AND DELIVERED INTERNAL DOCUMENTS Delivered to external users such as clients, contractors, government ministries, authorities having jurisdiction Delivered to internal users within the organization such as other departments, branches, offices or divisions for external or formal internal use			RETAIN DOCUMENT?
		Single Discipline – Single APEGBC professional of record	Single Discipline – Multiple APEGBC professional of record	Multiple Disciplines	
DRAFT DOCUMENT a work in progress; non-finalized document	No	No, unless required by other laws or regulation. If required, seal as per Originally Issued Document and mark accordingly (e.g. PRELIMINARY, NOT FOR IMPLEMENTATION, NOT FOR CONSTRUCTION)	No, unless required by other laws or regulation. If required, seal as per Originally Issued Document and mark accordingly (e.g. PRELIMINARY, NOT FOR IMPLEMENTATION, NOT FOR CONSTRUCTION)	No, unless required by other laws or regulation. If required, seal as per Originally Issued Document and mark accordingly (e.g. PRELIMINARY, NOT FOR IMPLEMENTATION, NOT FOR CONSTRUCTION)	Yes, if submitted for legal or regulatory purposes
MASTER DOCUMENTS reproducible documents that can be altered from which additional identical copies can be made (e.g., CADD files, mylars)	N/A	No	No	No	Retain only as long as needed for reproduction of copies
ORIGINALLY ISSUED DOCUMENTS document made from a master document and originally issued	N/A	Yes, single seal, signed and dated, by the <i>APEGBC professional of record</i>	Yes, seals, signed and dated by each <i>APEGBC professional of record</i> indicating their respective responsibility	Yes, seals, signed and dated by each <i>APEGBC professional of record</i> indicating their respective disciplines	Yes
BID, TENDER, PURCHASE OR PROCUREMENT DOCUMENTS documents prepared for any procurement process related to engineering and/or geoscience works including any addenda incorporated in documents during bidding process	No, if Tender, Purchase or Procurement documents are being issued to bidders as information only and bidders understand that they cannot rely on their completeness or accuracy (e.g., for budget pricing based on general works and degree of complexity).	Yes, seal as per Originally Issued Document and mark accordingly (e.g. FOR TENDER ONLY, NOT FOR CONSTRUCTION, NOT FOR IMPLEMENTATION)	Yes, seal as per Originally Issued Document and mark accordingly (e.g. FOR TENDER ONLY, NOT FOR CONSTRUCTION, NOT FOR IMPLEMENTATION)	Yes, seal as per Originally Issued Document and mark accordingly (e.g. FOR TENDER ONLY, NOT FOR CONSTRUCTION, NOT FOR IMPLEMENTATION)	Yes
ISSUED FOR CONSTRUCTION, IMPLEMENTATION OR USE DOCUMENTS documents prepared and deemed ready for construction, implementation or use including reissued Bid Documents where no changes were made during bidding	N/A	Yes, seal as per Originally Issued Document and mark accordingly ISSUED FOR CONSTRUCTION, IMPLEMENTATION OR USE If reissuing bid documents, see Reissued Documents	Yes, seal as per Originally Issued Document and mark accordingly ISSUED FOR CONSTRUCTION, IMPLEMENTATION OR USE If reissuing bid documents, see Reissued Documents	Yes, seal as per Originally Issued Document and mark accordingly ISSUED FOR CONSTRUCTION, IMPLEMENTATION OR USE If reissuing bid documents, see Reissued Documents	Yes

FIGURE 6-4: WHEN TO APPLY SEALS

STAGE OR TYPE OF DOCUMENT	INTERNALLY ISSUED CONCEPTUAL OR PRELIMINARY DOCUMENTS (not intended or ready to be relied upon by others) for use solely within the entity in which it was created such as a company, government ministry or an engineering or geoscience office or department.	EXTERNALLY ISSUED OR FORMALLY PREPARED AND DELIVERED INTERNAL DOCUMENTS Delivered to external users such as clients, contractors, government ministries, authorities having jurisdiction Delivered to internal users within the organization such as other departments, branches, offices or divisions for external or formal internal use			RETAIN DOCUMENT?
		Single Discipline – Single APEGBC professional of record	Single Discipline – Multiple APEGBC professional of record	Multiple Disciplines	
ELECTRONIC DOCUMENT documents in digital format	No	Yes, seal as per Originally Issued Document using electronic seal with digital certificate technology that meets APEGBC best practices (refer to Figure 6-2), or print to hard copy, seal, sign, date and retain in files	Yes, seal as per Originally Issued Document using electronic seal with digital certificate technology that meets APEGBC best practices (refer to Figure 6-2), or print to hard copy, seal, sign, date and retain in files	Yes, seal as per Originally Issued Document using electronic seal with digital certificate technology that meets APEGBC best practices (refer to Figure 6-2), or print to hard copy, seal, sign, date and retain in files	Yes, if sealed
DRAWINGS, MAPS OR PLANS BOUND INTO ANOTHER BOUND DOCUMENT bound booklets containing reports, drawings, plans, maps	No	No, provided the bound document is sealed	No, provided the bound document is sealed	No, provided the bound document is sealed	Yes, if sealed
DOCUMENTS SUBMITTED IN RESPONSE TO DEMAND-SIDE LEGISLATION (e.g. the <i>Occupational Health and Safety Regulations, BC Building Code</i> or <i>BC Safety Authority Act</i>)	N/A	Yes, seal as per Originally Issued Document	Yes, seal as per Originally Issued Document	Yes, seal as per Originally Issued Document	Yes
FIELD DOCUMENTS professional documents prepared and issued in the field that contain opinions or decisions that change the Issued for Construction documents	N/A	Follow up by preparing in office, sealing as per Originally Issued Document and retaining in files. Sealed copy does not need to be sent to field recipient.	Follow up by preparing in office, sealing as per Originally Issued Document and retaining in files. Sealed copy does not need to be sent to field recipient.	Follow up by preparing in office, sealing as per Originally Issued Document and retaining in files. Sealed copy does not need to be sent to field recipient.	Yes
SHOP DRAWINGS documents prepared and designed by an APEGBC professional for a fabricator, supplier, equipment manufacturer, installer or erector	No	Yes, seal as per Originally Issued Document (see APEGBC Professional Practice Guidelines – Shop Drawings)	Yes, seal as per Originally Issued Document (see APEGBC Professional Practice Guidelines – Shop Drawings)	Yes, seal as per Originally Issued Document (see APEGBC Professional Practice Guidelines – Shop Drawings)	Yes, if sealed
REISSUED DOCUMENT document made from a master document and reissued at a later date by original APEGBC professional of record	No	Yes. Clearly identify document is being re-issued; original APEGBC professional of record must seal, sign and date document with date re-issued	Yes. Clearly identify document is being re-issued; original APEGBC professional of record must seal, sign and date document with date re-issued	Yes. Clearly identify document is being re-issued; original APEGBC professional of record must seal, sign and date document with date re-issued	Yes, if sealed

FIGURE 6-4: WHEN TO APPLY SEALS

STAGE OR TYPE OF DOCUMENT	INTERNALLY ISSUED CONCEPTUAL OR PRELIMINARY DOCUMENTS (not intended or ready to be relied upon by others) for use solely within the entity in which it was created such as a company, government ministry or an engineering or geoscience office or department.	EXTERNALLY ISSUED OR FORMALLY PREPARED AND DELIVERED INTERNAL DOCUMENTS Delivered to external users such as clients, contractors, government ministries, authorities having jurisdiction Delivered to internal users within the organization such as other departments, branches, offices or divisions for external or formal internal use			RETAIN DOCUMENT?
		Single Discipline – Single APEGBC professional of record	Single Discipline – Multiple APEGBC professional of record	Multiple Disciplines	
REISSUED DOCUMENT document made from a master document and reissued at a later date by a different APEGBC professional of record	No	Yes. Clearly identify document is being re-issued; re-issuing APEGBC professional must seal, sign and date document with date re-issued	Yes. Clearly identify document is being re-issued; re-issuing APEGBC professionals must seal, sign and date document with date re-issued	Yes. Clearly identify document is being re-issued; re-issuing APEGBC professionals must seal, sign and date document with date re-issued	Yes, if sealed
REVISED DOCUMENT document changed from a master document, or an earlier revised document – by original APEGBC professional of record	No	Yes. Clearly identify revisions; original APEGBC professional of record must re-date and initial original seal with date revised	Yes. Clearly identify revisions; original APEGBC professionals of record must re-date and initial original seal with date revised	Yes. Clearly identify revisions; original APEGBC professionals of record must re-date and initial original seal with date revised	Yes, if sealed
REVISED DOCUMENT document changed from a master document, or an earlier revised document—by a different APEGBC Professional	No	Yes. Clearly identify revisions; APEGBC professional revising document must seal, sign and date revisions with date revised	Yes. Clearly identify revisions; APEGBC professionals revising document must seal, sign and date revisions with date revised	Yes. Clearly identify revisions; original APEGBC professional must re-date and initial original seal with date revised	Yes, if sealed
FINAL DESIGN DRAWINGS document that includes all design changes made by change order during construction, or by addenda during bidding and not previously incorporated in documents	N/A	Yes, seal as per Originally Issued Document	Yes, seal as per Originally Issued Document	Yes, seal as per Originally Issued Document	Yes
RECORD DRAWINGS document that includes as-constructed or as-implemented information	N/A	No, unless required to do so. If required, seal as per Originally Issued Document and, if document includes as-constructed information supplied by others, add declaration not accepting responsibility for that information.	No, unless required to do so. If required, seal as per Originally Issued Document and, if document includes as-constructed information supplied by others, add declaration not accepting responsibility for that information.	No, unless required to do so. If required, seal as per Originally Issued Document and, if document includes as-constructed information supplied by others, add declaration not accepting responsibility for that information.	Yes

FIGURE 6-4: WHEN TO APPLY SEALS

STAGE OR TYPE OF DOCUMENT	INTERNALLY ISSUED CONCEPTUAL OR PRELIMINARY DOCUMENTS (not intended or ready to be relied upon by others) for use solely within the entity in which it was created such as a company, government ministry or an engineering or geoscience office or department.	EXTERNALLY ISSUED OR FORMALLY PREPARED AND DELIVERED INTERNAL DOCUMENTS Delivered to external users such as clients, contractors, government ministries, authorities having jurisdiction Delivered to internal users within the organization such as other departments, branches, offices or divisions for external or formal internal use			RETAIN DOCUMENT?
		Single Discipline – Single APEGBC professional of record	Single Discipline – Multiple APEGBC professional of record	Multiple Disciplines	
DOCUMENTS FOR NON-BC WORK engineering or geoscience projects geographically located outside of BC	No	Seal only if a member or licensee in the respective jurisdiction where the works or projects are located. Where there is no licensure requirement seal as an <i>APEGBC professional</i>	Seal only if a member or licensee in the respective jurisdiction where the works or projects are located. Where there is no licensure requirement seal as an <i>APEGBC professional</i>	Seal only if a member or licensee in the respective jurisdiction where the works or projects are located. Where there is no licensure requirement seal as an <i>APEGBC professional</i>	Yes
DOCUMENT PREPARED BY A NON-BC PROFESSIONAL document prepared by an engineering or geoscience professional in another jurisdiction who is not licensed to practice in BC	No	Seal as per Originally Issued Document only after sufficient review of the project/works and document to assume full responsibility for both	Seal as per Originally Issued Document only after sufficient review of the project/works and document to assume full responsibility for both	Seal as per Originally Issued Document only after sufficient review of the project/works and document to assume full responsibility for the both	Yes, if sealed
DOCUMENT NOT PREPARED UNDER DIRECT SUPERVISION Document prepared by someone not under the direct supervision of the <i>APEGBC professional</i>	No	Seal as per Originally Issued Document only after sufficient review of the project/works and document to assume full responsibility for the document which includes the ability to alter and revise the document	Seal as per Originally Issued Document only after sufficient review of project/works and document to assume full responsibility for the document including altering or revising the document	Seal as per Originally Issued Document only after sufficient review of project/works and document to assume full responsibility for the document which includes the ability to alter and revise the document	Yes, if sealed
TRANSLATED DOCUMENTS Document containing same information in more than one language	No	Seal translated documents as per Originally Issued Document only if fluent in language to which document translated	Seal translated documents as per Originally Issued Document only if fluent in language to which document translated	Seal translated documents as per Originally Issued Document only if fluent in language to which document translated	Yes, if sealed
DOCUMENTS IN MULTIPLE LANGUAGES	No	Seal translated documents as per Originally Issued Document in multiple languages only if fluent in those languages	Seal translated documents as per Originally Issued Document in multiple languages only if fluent in those languages	Seal translated documents as per Originally Issued Document in multiple languages only if fluent in those languages	Yes, if sealed



7.0 Direct Supervision

Purpose

APEGBC professionals are required to directly supervise any engineering or geoscience work that they delegate. When working under the direct supervision of an *APEGBC professional*, unlicensed persons or non-members may assist in performing engineering and geoscience work, but may not assume responsibility for it. *APEGBC professionals* who are limited licensees may only directly supervise work within the scope of their license.

APEGBC professionals are employed in a range of sectors (listed in Section 1). Regardless of the sector, *APEGBC professionals* are required to directly supervise any engineering or geoscience work that they delegate. (Refer to Section 1 for more detail about when and where these obligations apply in all sectors.)

Processes for managing and delegating work are usually developed and implemented by the *organizations* that employ *APEGBC professionals*. This section provides guidance to *organizations* that want to implement policies and procedures that are consistent with the *Act* regarding the application of 'direct supervision'. It is intended to help *organizations* support the *APEGBC professionals* they employ, so that when the *APEGBC professionals* are delegating engineering or geoscience work to subordinates, they are better able to comply with the *Act* and the *APEGBC Quality Management Guidelines – Direct Supervision*. In addition, it will also support better customer service and risk management by *organizations*. The means and methods used to meet this *quality management requirement* are the prerogative of the *organization*.

Guidance

What is direct supervision?

Direct supervision is defined in the *Act* as, "means the responsibility for the control and conduct of the engineering or geoscience work of a subordinate". It does not necessarily mean, and more commonly is not, a direct reporting relationship, nor is it an administrative role involving the supervision of staff.

Why is adequate and appropriate direct supervision important?

When *APEGBC professionals* apply their professional seal to professional documents, or otherwise take professional responsibility for engineering or geoscience work, they are exposing themselves to personal liability for the work. When they delegate engineering or geoscience work, they remain responsible for the work. Adequate and appropriate direct supervision mitigates their risk, and ensures that *APEGBC professionals* retain appropriate control of that work.

What constitutes appropriate delegation of engineering and geoscience work?

Refer to the generic procedure for delegating engineering and geoscience resources, under Resources in this section.

When can engineering and geoscience work be delegated?

APEGBC professionals can delegate engineering or geoscience work only when that work will be carried out under their direct supervision (where supervision means controlling and overseeing the work) and only after they have appropriately assessed the suitability of the work for delegation to the subordinate.

To demonstrate that an *APEGBC professional* has provided direct supervision that meets the intent of the requirement, the *APEGBC professional* must be able to show active control and involvement in the project or work, with ongoing interaction and input.

It is preferred that an *APEGBC professional* is engaged throughout the engineering or geoscience work, to demonstrate that he or she is aware of delegated activities and work, throughout the project or work.

An *APEGBC professional* may demonstrate active involvement through his or her knowledge of the project or work, development or history; input on earlier drafts; review of particular elements throughout the project or work, or evidence of regular consultation.

When can engineering or geoscience documents prepared by others be sealed?

There are two circumstances in which *APEGBC professionals* may be called upon to seal documents prepared by others.

The first is where work is carried out under the direct supervision of the *APEGBC professional*, which is the subject of this section of the OQM Manual.

The second circumstance involves *APEGBC professionals* sealing documents prepared by others where the *APEGBC professional's* prior involvement is minimal. Detailed guidance on this topic is provided in the *APEGBC Quality Management Guidelines – Use of the APEGBC Seal*.

When may field reviews be delegated?

Delegation of work outside of the office is difficult, and care must be taken to ensure that appropriate practices are followed.

An *APEGBC professional* must directly supervise and carefully instruct subordinates who carry out field reviews. She or he must also have determined that the subordinate has the appropriate skills and competencies for the work.

An *APEGBC professional* may demonstrate direct supervision of a field review through specific instructions on what to observe, check, confirm, test, record and report.

An *APEGBC professional* must be able to demonstrate that the subordinate contacted him or her when the circumstances required it. The *APEGBC professional* must always be involved in any engineering or geoscience decisions or judgments.

Who can make engineering and geoscience decisions?

Throughout the project or work, an *APEGBC professional* must have some degree of involvement in, and take responsibility for, all engineering or geoscience decisions. This does not mean that the *APEGBC professional* must make every decision. Codes and standards of practice that the *APEGBC professional* has identified as relevant to the engineering and geoscience work involved can guide the subordinate's work.

The *APEGBC professional* must have understood the relevant issues, monitored the subordinate's work, given directions as needed, and reviewed each engineering or geoscience decision.

What is appropriate direct supervision?

The level of direct supervision may vary depending on the experience of the *APEGBC professional* and the subordinate, and the nature of the work. As the subordinate becomes more experienced, the level of direct supervision he or she requires will decrease.

The *APEGBC professional* may assign broader or multi-stepped tasks with less frequent involvement, as long as he or she is available when the subordinate has questions or needs direction.

How is direct supervision documented?

Delegated work must be properly and adequately documented, and submitted to the *APEGBC professional* for review. Records of delegated work and reviews must be retained to demonstrate that reviews of the subordinate's work by the *APEGBC professional* took place as planned.

Resources

Generic Procedure for Delegating Engineering and Geoscience Work

To delegate work to a subordinate, an *APEGBC professional* is required to:

1. Assess the work that may be delegated to confirm the knowledge, experience and capabilities required, and any tools or resources (e.g., standards, codes, etc.) that can be used to successfully implement the work.
2. Assess the subordinate to confirm that he or she has the required knowledge, capability and experience and to identify any gaps that must be addressed.
3. Make required tools and resources available and address any gaps in them, including identifying subject matter experts to be consulted during the work.
4. Address gaps in the subordinate's knowledge, skills and experience directly, through support from another more experienced individual available to assist, or by setting up a monitored learning experience.
5. Establish the subordinate's scope of work, duties, responsibilities, authorities, and limits on acting alone.
6. Create a plan defining when and how the subordinate's work will be reviewed.
7. Delegate the work to the subordinate and communicate the scope of work, duties, responsibilities, authorities, limits on acting alone, and the timing and process for required reviews.
8. Ensure that the delegated work is properly and adequately documented, and submitted for review as planned.
9. Retain documentation to demonstrate that professional reviews of the subordinate's work took place as planned.

A checklist for demonstrating whether *APEGBC professionals* in the *organization* are meeting the direct supervision requirement can be found in Figure 7-1.

OQM Certification Requirements

What is the overall requirement for OQM certification?

APEGBC professionals are directly supervising any engineering or geoscience work they delegate.

What will the OQM auditor look for?

The OQM auditor will confirm that:

- The *organization* has policies and procedures in place for managing the delegation of engineering and geoscience work
- Policies and procedures are documented and communicated to those involved in delegating or carrying out delegated work
- *APEGBC professionals* are actively involved in work they delegate by:
 - Having knowledge of all stages of the project or work
 - Having knowledge of the development or history of the project or work
 - Providing input on earlier drafts
 - Reviewing particular elements in earlier stages
 - Being regularly consulted throughout the project or work
- *APEGBC professionals* are providing appropriate supervision by:
 - Being located in the same workplace as, or regularly communicating with, the subordinate
 - Being available to the subordinate during the project or work

- Periodically reviewing the subordinate's work
- Being consulted throughout the project or work, and not just at final stage
- *APEGBC professionals* are adequately supervising field reviews by:
 - Assessing circumstances to determine if delegating field reviews is appropriate
 - Assessing the complexity and critical nature of field review, to determine whether the subordinate can provide the required level of quality and accuracy
 - Assessing whether the subordinate has the required level of training and experience for the field review
 - Providing careful instructions to those who carry out the field reviews, about the required effort, reporting detail, and specific aspects of the construction activities to be reviewed
 - Giving instructions including what to confirm, test, record, and report
 - Being involved in making any engineering or geoscience decisions or judgments required in the field
 - Reviewing and following up on field reports
- *APEGBC professionals* are involved in all engineering and geoscience decisions by:
 - Being available to answer subordinate's questions about decisions
 - Being aware of relevant input requirements, design criteria, methods of analysis, selection of resource materials and systems, field conditions, engineering and geoscience methodologies being applied, economics of alternate solutions, environmental considerations, and other relevant considerations
 - Reviewing each engineering and geoscience decision and the reasons for making it
- *APEGBC professionals* are providing supervision appropriate to the experience of the subordinate by:
 - Assessing experience levels and setting up an appropriate supervision plan
 - Assigning broader or multi-stepped tasks with decreasing frequency of reviews as the subordinate's experience increases
 - Being available to answer subordinate's questions and provide direction

FIGURE 7-1: CHECKLIST FOR THE ORGANIZATION TO CONFIRM APPROPRIATE DIRECT SUPERVISION

CAN THE APEGBC PROFESSIONAL DEMONSTRATE THAT HE OR SHE:		√
DEMONSTRATING ACTIVE INVOLVEMENT, CONTROL AND INTERACTION IN THE PROJECT OR WORK		
1	Has knowledge of all stages of the project or work	
2	Has knowledge of the development or history of the project or work	
3	Provided input on earlier drafts	
4	Reviewed particular elements in earlier stages	
5	Was regularly consulted throughout the project or work	
DEMONSTRATING APPROPRIATE SUPERVISION		
6	Was located in the same workplace as, or regularly communicating with, the subordinate	
7	Was available to the subordinate during the project or work	
8	Periodically reviewed the subordinate's work	
9	Consulted throughout the project or work and not just at the final stage	
DEMONSTRATING ADEQUATE SUPERVISION OF FIELD REVIEWS		
10	Assessed circumstances to determine if delegating field reviews is appropriate	
11	Assessed complexity and critical nature of field review to determine whether the subordinate can provide the required level of quality and accuracy	
12	Assessed whether the subordinate has the required level of training and experience for the field review	
13	Provided careful instructions to those who carried out the field reviews about the required effort, reporting detail, and specific aspects of the construction activities to be reviewed	
14	Gave instructions including what to confirm, test, record, and report	
15	Was involved in making any engineering or geoscience decisions or judgments required in the field	
16	Reviewed and followed up on field reports	
DEMONSTRATING INVOLVEMENT IN ALL ENGINEERING AND GEOSCIENCE DECISIONS		
17	Was available to answer subordinate's questions about decisions	
18	Was aware of relevant input requirements, design criteria, methods of analysis, selection of resource materials and systems, field conditions, engineering and geoscience methodologies being applied, economics of alternate solutions, environmental considerations, and other relevant considerations	
19	Reviewed each engineering and geoscience decision and the reasons for making it	
DEMONSTRATING SUPERVISION APPROPRIATE TO EXPERIENCE OF APEGBC PROFESSIONAL AND SUBORDINATE		
20	Assessed experience levels and set up an appropriate supervision plan	
21	Assigned broader or multi-stepped tasks with decreasing frequency of reviews as the subordinate's experience increased	
22	Was available to answer subordinate's questions and provide direction	



8.0 Field Reviews

Purpose

APEGBC professionals are required to establish and maintain documented *quality management* processes, which include carrying out documented field reviews of their domestic projects or work during implementation or construction. Domestic works or projects include those located in Canada and for which an *APEGBC professional* meets the registration requirements for the engineering or geoscience regulatory body that has jurisdiction.

Although terminology may differ across sectors, and field reviews may depend on the nature of the work, these obligations apply to *APEGBC professionals* in all sectors (listed in Section 1). Field reviews in this context do not apply only to project-based engineering or geoscience work. They also involve reviewing the implementation of ongoing engineering or geoscience work in any sector. (Refer to Section 1 for more detail about when and where these obligations apply in all sectors.)

The following examples illustrate how field reviews may occur in consulting and non-consulting *organizations*:

- **Example 1 – Consulting:** Engineering or geoscience documents are prepared by, or under the direct supervision of, an *APEGBC professional of record*. Contractors bid on the work, and one is selected to construct or install it.
 - In this instance, the *APEGBC professional of record* or subordinate carries out periodic field reviews during the construction or installation, to confirm that the construction or installation is in conformance with the engineering or geoscience concepts or intent laid out in the engineering or geoscience documents prepared for the work.
- **Example 2 – Manufacturing or Technology:** A process or program is engineered by the *APEGBC professional of record* in a manufacturing or technology *organization*. The *organization* implements the process or program using internal or external resources to create an end product or end result.
 - In this instance, the *APEGBC professional of record* or subordinate may conduct testing, review test results, inspect operations, review quality control processes, or carry out other actions, to confirm that the implementation meets the engineering concepts or intent laid out in the engineering or geoscience documents prepared for the work.

Field review processes are usually developed and implemented by the *organizations* that employ *APEGBC professionals*. This section of the OQM Manual provides guidance to the *organizations* that want to implement policies and procedures that are consistent with *Bylaw 14(b)(3)* regarding documented field reviews using a written *quality management* process. It is intended to help *organizations* support the *APEGBC professionals* they employ, so that the *APEGBC professionals* are better able to comply with the *Bylaw* and the *APEGBC Quality Management Guidelines – Documented Field Reviews During Implementation or Construction*. In addition, it will also support better customer service and risk management by *organizations*. The means and methods used to meet this *quality management requirement* are the prerogative of the *organization*.

Guidance

What are field reviews?

Field reviews are reviews conducted at the site of the construction or implementation of the engineering or geoscience work by an *APEGBC professional* or his or her subordinate acting under his or her direct supervision, that the *APEGBC professional* in his or her professional discretion considers necessary to ascertain whether the construction or implementation of the work substantially complies in all material respects with the engineering or geoscience concepts or intent reflected in the engineering or geoscience documents prepared for the work.

As a result of the field review, the field reviewer provides interpretations, observations, and advice to the appropriate party (e.g., contractor, operations managers or other party responsible for the implementation or construction) about nonconforming work observed in the field review. He or she does not provide instructions about how to rectify or carry out the corrective work.

What are field reviews not intended to do?

Field reviews are not supervision or inspection of the work. They are also not a guarantee that all deficiencies will be found. The field reviewer is not taking responsibility for work installed, implemented or constructed by others.

Field reviews do not relieve the party responsible for implementing or constructing the work of its responsibility for supervising the work, delivering work that is in conformity with the engineering or geoscience intent, and deciding the means and methods for doing so.

Field reviews are also not an inspection of safety at a contractor-controlled site or a site managed by others, nor are they a review of the respective safety program. This does not mean that *APEGBC professionals* may look the other way when they see a safety violation or concern. *APEGBC professionals* have a duty to hold public safety paramount. When an *APEGBC professional* becomes aware of a safety violation or concern, she or he must advise the appropriate party in control of the site or responsible for site safety and, if no action is taken, the client or relevant authorities. When these actions fail and the *APEGBC professional* believes that workers or the public are in imminent danger, he or she has a duty to stop the work immediately. If attempts to stop the work fail, the *APEGBC professional* should make an immediate call to WorkSafeBC for assistance and indicate the urgency of the situation. When acting in good faith, *APEGBC professionals* should be supported by the organizations that employ them.

Why are field reviews important?

Field reviews allow the *APEGBC professional* to confirm that their engineering or geoscience work is being implemented, used, installed, or constructed in general conformance to the engineering or geoscience concepts or intent laid out in the engineering or geoscience documents prepared for the work. Field reviews provide the *APEGBC professional* with the opportunity to identify nonconforming work, and have it rectified or replaced, as appropriate. They also help *APEGBC professionals* keep their employer, the client, the owner, and other relevant professionals informed about the quality of the work.

What constitutes a documented field review process?

The process may be captured in a written procedure, process flowchart, checklists, forms to record field reviews or other documentation suited to the nature of the work undertaken by *APEGBC professionals*. See the Generic Procedure for Documented Field Reviews under Resources in this section.

How many field reviews are required?

The number and extent of field reviews must always remain at the discretion of the *APEGBC professional*. Consequently, it is contrary to the *APEGBC professional's* obligations to agree in advance to a fixed number or extent of field reviews. It is appropriate for the *APEGBC professional* to provide their employer, client or the owner with an estimate of the number of anticipated field reviews and/or the cost per field review visit.

To determine the extent of field reviews required, *APEGBC professionals* should assess the:

- Level and nature of risk, complexity, unknown conditions and duration of the implementation or construction
- Standard of practice for the type and nature of work to be reviewed
- Related *APEGBC* practice guidelines
- Applicable legislation, codes, standards or other regulatory requirements which may be relevant to the nature of the field review to be carried out (e.g., *BC Building Code*, *Occupational Health and Safety Regulation*)
- Level of detail provided in the engineering or geoscience documentation prepared for the project or work
- Experience, expertise, reputation and method of selection (e.g., public tender, pre-qualified bidders or negotiated) of those implementing or constructing the work
- Quantity of deficiencies found early in the project or work
- Experience of those carrying out the field reviews

APEGBC professionals must act reasonably, but must not acquiesce to client or employer demands to conduct fewer field reviews than the *APEGBC professional* believes are necessary.

APEGBC professionals may not rely on the expectation that a client, owner or regulatory authority is subsequently carrying out reviews of the work as a reason to reduce the number of reviews that the *APEGBC professional* carries out.

Educating clients, owners or employers before field work begins, about the purpose of field reviews and the *APEGBC professional's* obligations under the *Act* and *Bylaws* to assess and determine the extent of field reviews to be carried out during implementation or construction, will help to avoid misunderstandings later.

The number of reviews should be consistent with the standard of care for the specific engineering and geoscience work. The number and frequency of the field reviews may need to be increased if more deficiencies than expected are found early in the project or work.

To address concerns that the number of field reviews is insufficient, *APEGBC professionals* are to:

1. Approach the client, owner or employer about the need and rationale for more field reviews.
2. If unsuccessful in receiving agreement or payment for the additional field reviews, document and communicate to the client, owner or employer the consequences of not conducting sufficient field reviews, such as:
 - Placing public safety at risk
 - Having to notify a regulatory body
 - Not being able to execute Letters of Assurance required by the *BC Building Code*
 - Not being able to seal assurance statements required by other legislation

If despite the client, owner or employer being informed of the consequences, permission or payment is not approved for an adequate number of field reviews as judged by the *APEGBC professional*, the *APEGBC professional* must consider how they will fulfill their obligations under the *Bylaw*. One possibility is that the *APEGBC professional* may consider notifying the appropriate regulatory authority and removing himself or herself from the project. A record of this communication must be placed in the project or work file.

When should field reviews be conducted?

Field reviews should occur periodically to suit the nature and progress of the implementation or construction.

APEGBC professionals, engaged to conduct field reviews by the client or employer, must carry out field reviews, or arrange to have them carried out, for critical components during the implementation or construction phase. Where a critical component has been covered or enclosed before the required field review is carried out, the *APEGBC professional of record* should request that the work be opened up for review. Where uncovering or opening up the work is not feasible or practical, the *APEGBC professional of record* can provide an opinion about what was observed relevant to the work and the performance of the party implementing or constructing the work. He or she should also identify and communicate to the client or owner, the consequences of not seeing the work or the rationale for not uncovering it.

Consideration should be given to conducting some reviews randomly and unannounced so that the field reviewer is not observing work only when the contractor or operations manager has had opportunity to prepare for the review.

Where manufactured equipment or products, for installation or use in BC, have been designed and constructed or fabricated outside BC, the *APEGBC professional of record* should prepare performance specifications that require the constructor/fabricator to certify the equipment or products. The *APEGBC professional of record* must exercise their professional discretion to determine whether field reviews are required at the out-of-province facility during fabrication or construction.

Once the equipment is received, the *APEGBC professional of record* is required to check the quality of what is received, and confirm that it meets any BC Occupational Health and Safety or BC Safety Authority requirements. The *APEGBC professional of record* is also responsible for carrying out field reviews of any on-site services to the equipment.

What tasks are carried out in a field review?

Field reviews may involve observations, testing or surveying. Outcomes may include interpretations, advice, test reports, or surveys. Field reviews may also involve reviewing quality control processes.

Testing and analysis should be carried out to recognized standards. Surveying and testing equipment should be periodically calibrated to recognized standards and checked, where possible, before each use.

Who can conduct a field review?

An *APEGBC professional* must carry out the field review, or delegate it to a qualified individual working under the direct supervision of the *APEGBC professional*. This individual does not need to be a direct report, and in most instances is not. *APEGBC* recommends that the *APEGBC professional of record* who is responsible for preparing the engineering or geoscience documents for the work also be responsible for the field review.

The *APEGBC professional* must assess the field review requirements to determine whether or not to delegate the field reviews to other qualified individuals. In doing so, the *APEGBC professional* must assess the level, complexity or critical nature of the field review, and the level of training and experience of any potential reviewer, versus the level required for the field reviews.

The *APEGBC professional* must provide direction regarding the timing, frequency, and focus of field reviews. He or she must give clear directions about the required effort, reporting detail, and specific aspects of the construction or implementation activities to be reviewed.

The *APEGBC professional* must be involved in any engineering or geoscience decisions made during or as a result of, the field review.

As opportunity allows, the *APEGBC professional* should carry out field reviews in the presence of a representative of the owner or client and the party responsible for the implementation or construction.

What if the *APEGBC professional of record* is not carrying out the field reviews?

The *Bylaw* requires that an *APEGBC professional* or someone under his or her direct supervision carries out field reviews. *APEGBC* strongly recommends that the *APEGBC professional of record*, who is professionally responsible for the preparation of the engineering or geoscience documents, also be responsible for field review. *APEGBC* understands that for various reasons, this may not always be the case. In some instances, the client, owner or employer may choose not to use the *APEGBC professional of record* for the required field reviews. In these circumstances, *APEGBC professionals* are required to have documented protocols in place that address the following:

1. Obtaining written confirmation from the client, owner or employer about how and by whom field review will be carried out.
2. Confirming that a qualified engineering or geoscience professional, as appropriate to the work and registered in the governing jurisdiction where the implementation or construction will occur, will be conducting or directly supervising the field review.
3. Advising the client, owner or employer and the professional responsible for the field review of his or her availability to answer questions regarding the work during implementation or construction.
4. Consideration be given to requesting copies of field review reports, as appropriate.
5. Retaining a record of any communication confirming steps 1 to 4 and the client, owner or employer's response.

For buildings in BC covered under the *BC Building Code*, the *APEGBC professional*, responsible for field reviews would be the Registered Professional who signs the Letters of Assurance under the *BC Building Code*.

If the *APEGBC professional of record* cannot confirm that field reviews will be carried out by a professional licensed or registered in the governing jurisdiction or a qualified party under that professional's direct supervision, the *APEGBC professional of record* must:

1. Advise the client, owner or employer of the *APEGBC professional's* obligations under the *Act and Bylaw* and the consequences of the client, owner or employer not having appropriate field reviews carried out including:
 - Placing public safety at risk;
 - Having to notify a regulatory body;
 - Not being able to execute required Letters of Assurance; and
 - Not being able to seal other legislated assurance statements.
2. If the client, owner or employer continues to refuse to authorize appropriate field review, the *APEGBC professional* is required to notify the appropriate regulatory body and consider removing him or herself from the project.

Although not within *APEGBC's* mandate, similar protocols are recommended for work requiring field review outside of Canadian jurisdictions.

How should observations from field reviews be addressed?

When work observed through field reviews at the implementation or construction phase does not conform to the engineering or geoscience concepts or intent laid out in the relevant engineering or geoscience documents, the nonconforming work must be documented and communicated to the party responsible for the implementation or construction. This communication must be in writing, and depending on the severity of the discrepancies between the relevant engineering and geoscience documents and the observation made in the field reviews, the work may be rejected by the *APEGBC professional*.

Instructions about any work to be removed and replaced or rectified must be given to the party responsible for the implementation or construction, in writing, at the time of the field review. A copy of a hand written report should be provided at the time, even if a typewritten one will follow later.

Care must be taken not to provide advice that could be construed as taking responsibility for how to correct any nonconforming work. The party responsible for the implementation or construction must remain responsible for the means and methods.

The *APEGBC professional* must continue to report nonconforming work until it is rectified. When the work is rectified, he or she must confirm and record that the work is rectified as directed, or document why this did not occur, and what approach other than rectifying the work was employed.

How are field reviews documented?

All field reviews must be documented. Documentation may be in notebooks, reports, forms, meeting minutes, photographs, videos, or other documentation. Use standard forms developed to suit the work to assist in consistently capturing all required information. Field review documentation must be retained as a record.

Records showing when and where the surveying and monitoring equipment was used, calibration results and timing, and the current status of the equipment, should also be retained with project or work documentation.

Resources

Generic Procedure for Documented Field Reviews

To carry out field reviews, an *APEGBC professional* is required to:

- Assess the nature of the engineering or geoscience work involved, and the complexity of the engineering or geoscience services to be completed, during the implementation or construction phase.
- Determine the number, timing and focus of field reviews required to meet the standard of care for the work.
- Determine whether field reviews are suitable for delegation, and determine whether qualified subordinates are available.
- Document, and agree upon with the client, owner or employer, the scope of required field reviews, including any requirements for testing or surveying.
- Communicate to the party responsible for the implementation or construction the specific aspects of construction or implementation activities that will be reviewed and requirements for providing notice of when they will be ready to observe, test or survey.
- Where field reviews will be delegated to a subordinate, provide direction about the required efforts, reporting detail, and specific aspects of construction or implementation activities, that must be observed, tested or surveyed.
- Document all field reviews, including date, time, location, work reviewed, observations made and directions given.
- Carry out field reviews as required and planned.
- Adjust the extent of field reviews required, as needed, based on the number of issues observed.
- Where appropriate, take photographs or videos to capture and document observations made during field reviews, taking care to create an audit trail by:
 - Checking the equipment, date and time settings before taking photographs
 - Including a description of what was photographed along with the date, time, location and photographer
 - Enhancing, cropping or otherwise editing photographs only for clarity, and retaining the original, unaltered photo along with the edited photo
 - Downloading and storing all photographs taken on the designated server or media
 - Creating a non-editable back-up of all photographs
- Provide directions about nonconforming work and required resolution to the party responsible for the implementation or construction in writing, with copies to the client and project or work files.
- Leave the means and methods for correcting nonconforming work to the party responsible for the implementation or construction.
- Be involved in engineering and geoscience decisions made by the subordinate carrying out the field reviews.
- Advise the client, owner or employer of any required or proposed revisions to the work that will result in changes in the cost, schedule, or function, and receive approval to proceed before directing the party responsible for the implementation or construction to revise the work.
- Continue to report nonconforming work observed in field reviews until it is rectified.
- Confirm and document how the party responsible for the implementation or construction has addressed any nonconforming work observed in field reviews.
- Retain field review documentation as records.

In cases where the *APEGBC professional of record* or someone under his or her direct supervision will not be involved in field reviews, he or she must:

1. Obtain written confirmation from the client, owner or employer about how and by whom field review will be carried out.
2. Confirm that a qualified engineering or geoscience professional, as appropriate to the work and registered in the governing jurisdiction where the implementation or construction will occur, will be conducting or directly supervising the field review.
3. Advise the client, owner or employer and the professional responsible for the field review of his or her availability to answer questions regarding the work during implementation or construction.
4. Consider requesting copies of field review reports, when appropriate.
5. Retain a record of any communication confirming steps 1 to 4 and the client, owner or employer's response.

For buildings in BC covered under the *BC Building Code*, the *APEGBC professional*, responsible for field reviews would be the registered professional who signs the Letters of Assurance under the *BC Building Code*.

If the *APEGBC professional of record* cannot confirm that *field reviews* will be carried out by a professional licensed or registered in the governing jurisdiction or a qualified party under that professional's direct supervision, the *APEGBC professional of record* must advise the client, owner or employer of the *APEGBC professional's* obligations under the *Act* and *Bylaw* and the consequences of not having appropriate *field reviews* carried out. If the *APEGBC professional of record* confirms that there is no intent to authorize appropriate *field review*, the *APEGBC professional* must notify the appropriate regulatory body and consider removing him or herself from the project.

OQM Certification Requirements

What is the overall requirement for OQM certification?

The *organization* is carrying out documented field reviews during the implementation or construction phase, based on a documented process, to confirm conformance with the concepts or intent represented in the relevant engineering or geoscience documents.

What will the OQM auditor look for?

The OQM auditor will confirm that:

- The *organization's APEGBC professionals* are using a documented process to carry out field reviews
- *APEGBC professionals* are not predetermining the number of field reviews required
- Appropriate criteria including level of risk is being used by *APEGBC professionals* to assess the extent of field reviews
- Field reviews appropriate to the work are being carried out during the implementation or construction
- Where possible, field reviews are being carried out by the *APEGBC professional of record* or someone under his or her direct supervision
- *APEGBC professionals* have appropriate documented protocols in place for situations where the client, owner or employer decides to use someone other than the *APEGBC professional of record* to carry out field reviews
- Field reviews are occurring at critical points in the implementation or construction
- Where critical work has been covered up before a field review, *APEGBC professionals* are requesting that it be uncovered or advising the client, owner or employer of the consequences of or rationale for not viewing the work, and noting it in the file
- *APEGBC professionals* are advising their client, the owner or the employer when more field reviews are required and why
- *APEGBC professionals* are advising their client, the owner or the employer of the consequences of not carrying out the added field reviews and taking appropriate action
- Observations made during field reviews are being documented and communicated to those responsible for the implementation or construction, in writing, at the time of the review
- Field reviewers are advising what must be rectified or replaced, but are not telling those responsible for the implementation or construction how to rectify the problem
- Nonconforming work observed in field reviews is being tracked until the work is rectified as directed by the field reviewer
- All field reviews are being documented
- A procedure is in place, and being implemented, for the creation and storage of any photographic or video records
- Field review documentation is being retained as a record



9.0 Implementing Organizational Quality Management

What does it mean to implement Organizational Quality Management?

Organizations may implement (OQM) as described in this manual, voluntarily, by creating policies and procedures that are:

- Specific to the professional engineering and geoscience products and services they provide
- Consistent with the *quality management requirements* stated in the *Act* and *Bylaws*

In choosing to implement a program consistent with the *quality management requirements*, and to become an *organization* that has achieved APEGBC OQM certification, the *organization* has four options:

1. Use policies and procedures it has already established, that are consistent with the *quality management requirements*.
 - Review the OQM Manual to confirm that this is the case.
2. Adjust the policies and procedures it has in place to become consistent with the *quality management requirements*.
 - Review the OQM Manual and revise existing policies and procedures, as needed, to be consistent with the *quality management requirements*.
3. Create new policies and procedures that are consistent with the *quality management requirements*.
 - Use the material included in the OQM Manual to create policies and procedures consistent with the *quality management requirements*.
4. Adopt the APEGBC OQM Manual as an umbrella policy document.
 - Review the OQM Manual and create standard operating procedures for each *quality management requirement* or section of the OQM Manual.

When does the OQM Program and Manual apply?

APEGBC's OQM Program is applicable to all *organizations* that employ APEGBC *professionals* and provide services or products requiring the application of professional engineering or professional geoscience, spanning all sectors including, but not limited to:

- | | | |
|---|--|----------------------------|
| • aerospace | • healthcare | • operations |
| • construction | • high technology | • research and development |
| • consulting | • light and heavy industry | • utilities |
| • educational | • manufacturing | |
| • first nations | • marine engineering and
naval architecture | |
| • government
(all 3 levels and agencies) | • natural resources | |

These obligations apply to *APEGBC professionals* in all sectors where their work in their professional capacity may apply to or be used in:

- Ongoing engineering and geoscience work
- Projects with a defined start and finish
- Products and services requiring the application of professional engineering or professional geoscience
- Engineering and geoscience deliverables such as reports, drawings, specifications and other deliverables
- Implementation or use of engineering and geoscience work as may be found in a manufacturing facility, technology company, operations, or utilities work
- Construction or installation of engineering or geoscience work
- Implementation or construction carried out by the *APEGBC professional's organization's* own forces or by others
- Engineering or geoscience work carried out for internal use by the *APEGBC professional's organization* or for use by others

How does the OQM Program apply in various sectors?

Examples of how the OQM Program may apply in different sectors are presented in Figure 9-5 under Resources in this section.

What is OQM Certification?

APEGBC will grant OQM certification to *organizations* that demonstrate that they have met the following criteria:

1. The *organization* has *APEGBC professionals* on active staff for each area of engineering and geoscience practice that it undertakes, and
2. The *organization* has implemented policies and procedures that are consistent with the *quality management requirements* listed below and described in this manual:
 - Its *APEGBC professionals* apply all relevant *APEGBC* practice guidelines
 - The *organization* retains complete project documentation suited to the engineering and geoscience work that it undertakes for a minimum period of ten (10) years
 - The *organization* has implemented documented checking of its engineering and geoscience work, using a written quality control process
 - Structural design carried out in the *organization* undergoes documented independent structural reviews that meet the relevant *quality management requirement*
 - Use of seals by the *organization's APEGBC professionals* is consistent with the respective *quality management requirement*
 - *APEGBC professionals* within the *organization* are directly supervising all engineering and geoscience work that they delegate
 - *APEGBC professionals* within the *organization* are carrying out, or directly supervising, documented field reviews of engineering or geoscience projects, or ongoing work during implementation or construction

OQM certification will apply to single-office and multi-office *organizations* that employ *APEGBC professionals* for work in BC. Holding or shell companies that do not directly perform professional engineering or professional geoscience work in BC are not eligible for OQM certification, even if they have engineering or geoscience subsidiaries. Their engineering or geoscience subsidiaries are eligible. *Organizations* that do not have permanent offices in BC may qualify for OQM certification to propose on work in BC based on certifications in their resident jurisdiction such as APEGA's Permit to Practice.

Why is OQM Certification important to organizations?

APEGBC is implementing the OQM certification program to recognize *organizations* in BC that have satisfactorily demonstrated that they have policies and procedures consistent with the *quality management requirements* in place and used by their *APEGBC professionals*.

In time, APEGBC expects:

- The marketplace to see OQM certification as adding value to *organizations* that become certified
- Based on first-hand experience, *OQM organizations* to be seen as delivering better quality products and services
- OQM certification to be included, along with other important qualifications, in selection criteria for engineering and geoscience products and services
- OQM will reinforce, to those procuring engineering/geoscience services, the importance of considering *quality management* practices as well as other qualifications in any selection process.

APEGBC professionals in *organizations* that have OQM certification will not be subject to random selection for APEGBC practice reviews, thereby saving the *organization* the time, effort and cost to prepare for and participate in them.

For *organizations*, where policies and procedures consistent with the *quality management requirements* are not currently in use, implementing such policies and procedures may improve efficiency across operations, effectiveness of processes, and the quality of the engineering and geoscience products or services they deliver.

What is the OQM certification process?

The certification process (refer to Figure 9-1) is as follows:

- *Organizations* wishing to become OQM certified initiate participation by signing up at apeg.bc.ca/oqm-sign-up.
- Register online for a representative to attend an OQM Certification Training Session (sessions held approximately every 2–3 months).
- Electronically submit your OQM Application Package consisting of:
 - o a completed OQM Certification Application Form, available at apeg.bc.ca/oqmapp.
 - o your compiled quality management policies and procedures.

Application package can be uploaded using the link found at the bottom of the OQM webpage apeg.bc.ca/oqm or emailed to oqm@apeg.bc.ca.

- APEGBC will invoice you for the OQM Certification fee, and will review the OQM certification application and documentation, confirm attendance at the OQM training, and if the applicant meets all requirements, issue an OQM certificate to the applicant *organization*.
- APEGBC publishes the names of all *organizations* that have current OQM certificates on apeg.bc.ca/oqm-certified.
- APEGBC will issue annual renewal notices to OQM certified *organizations* in May (annual renewal date is June 30). *Organizations* wishing to renew will submit the application, Attestation, any substantive revisions to their required policies and procedures, and the required annual fee (see Figure 9–2).
- Within the first five years of the OQM Program and each succeeding five-year period, each *OQM organization* will undergo an OQM audit. APEGBC auditors will carry out the audit to confirm that the *organization* has documented and implemented policies and procedures consistent with all the *quality management requirements* (see Figure 9–4: OQM Audit Checklist). The OQM audit will take place at the *organization's* place of business or in the case of a multi-office *organization*, it will include a minimum number of offices ($\sqrt{\text{total number of BC offices}}$), and always include the *organization's* main BC office.
- *Organizations* not able to demonstrate in the OQM audit that they continue to meet the *quality management requirements* will be advised of required corrective action and, depending on the severity of the findings, may either have their certificate retracted or be granted a period of time to take the corrective action. Re-auditing to confirm that corrective action has been implemented will be paid for by the *organization* on a cost-recovery basis.

¹ APEGBC reserves the right to require retraining where significant changes are made to the *quality management requirements* as stated in the *Act and Bylaws*.

² Making inaccurate or misleading statements in the Attestation or Application Form may result in a complaint to APEGBC's Investigation Committee and could result in a disciplinary hearing.

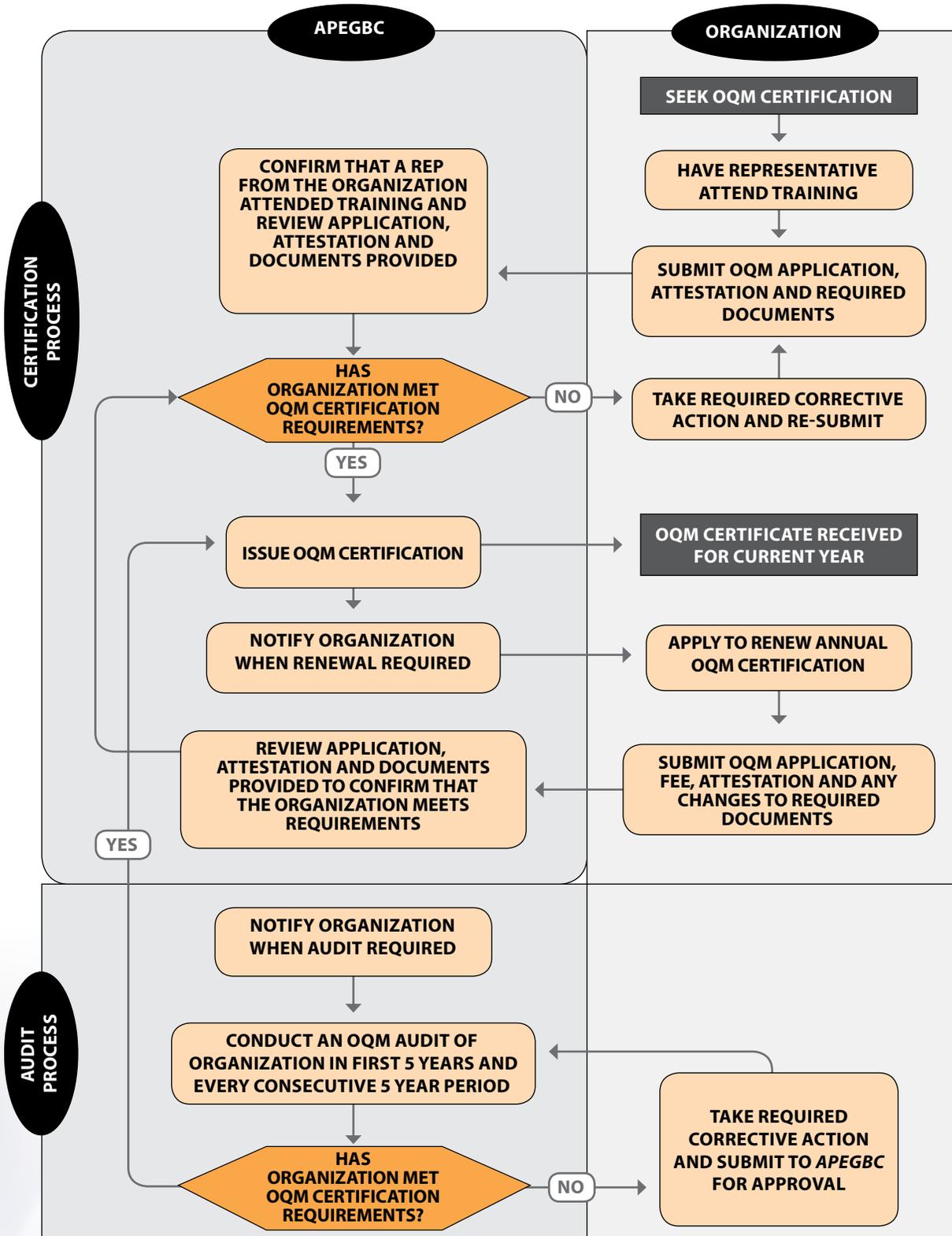
What will be covered in an OQM audit?

In the OQM audits, *organizations* will be required to demonstrate that they are meeting the intent of all *quality management requirements*. The detailed requirements are included in the OQM Audit Checklist (see Figure 9-4: OQM Audit Checklist).

Resources

- Figure 9-1: OQM Certification Process Flowchart
- Figure 9-2: OQM Certification Fees
- Figure 9-3: OQM Certification Application Form
- Figure 9-4: OQM Audit Checklist
- Figure 9-5: Examples of OQM Applied in Various Sectors

FIGURE 9-1: OQM CERTIFICATION PROCESS



Where an *organization* chooses not to take the corrective action identified in the OQM audit, APEGBC will revoke its OQM certificate.

FIGURE 9-2: OQM CERTIFICATION FEES

Organizations pay \$200 per attendee to attend an OQM Certification Training Session. Upon submission of the *organization's* OQM application APEGBC will invoice the organization for the OQM Certification fee prorated to June 30, the next annual certification date. Subsequently, certification fees are due on June 30 each year.

The fees cover certification and an OQM audit by APEGBC once every five years.

The calculation for OQM certification fees uses the number of APEGBC professionals employed by the *organization* applying for OQM certification. This does not include EITs or GITs.

The annual fees for OQM certification are calculated using the following formula:

$$\text{OQM Certification Fees} = \$200 \times \sqrt{N}$$

Where N = number of APEGBC professionals in the *organization* (does not include EITs or GITs) applying for OQM certification, and the square root of N (\sqrt{N}) is rounded to a whole number using standard rounding rules.

The following table gives some examples of fees payable using this formula:

NUMBER OF APEGBC PROFESSIONALS (N)	ANNUAL FEES (\$200* \sqrt{N})
1	\$200
5	\$400
10	\$600
15	\$800
25	\$1,000
50	\$1,400
75	\$1,800

OQM Certification for Multi-Office Organizations

APEGBC will audit a required minimum number of offices every five years, including the BC head or main office, to grant OQM certification to a multi-office *organization*. The minimum number is calculated using the following formula:

$$\text{Minimum number of offices audited} = \sqrt{O}$$

Where O = number of offices with a fixed address (e.g. not field offices) that the *organization* has in BC, and the result of the calculation is rounded to a whole number using standard rounding rules.

The annual fee for OQM certification for multi-office *organizations* is the same as the fee for single-office *organizations*.

Organizations having multiple offices within BC, that chose to have more offices audited than the minimum required under the formula, must pay for such audits on a cost-recovery basis. APEGBC is available to review with an *organization* the costs associated with carrying out such additional audits of offices.

Out of Province Organizations

APEGBC will accept comparable certifications from other provinces, such as APEGA's Permit to Practice, for *organizations* that do not have a fixed office in BC and wish to become OQM certified for work they are pursuing or performing in BC.

Re-Auditing

Where OQM audit deficiencies are identified that require a re-audit, APEGBC will re-audit on a cost-recovery basis.

FIGURE 9-3: OQM CERTIFICATION APPLICATION FORM

Electronic version available at apeg.bc.ca/oqmapp.

_____ Date (yy/mm/dd)

1. ORGANIZATION

Name of Organization

Address of Organization (main office in BC)

Contact Person

Phone Number

E-mail

Number of Offices within BC

Number of APEGBC Professionals Employed by Organization (excluding EITs and GITs)

If multiple BC offices, number of APEGBC Professionals at Main BC Office

2. SECTORS

ORGANIZATIONS IN THE (√ CHECK ONE):		
<input type="checkbox"/> Public Sector	<input type="checkbox"/>	<input type="checkbox"/> Private Sector

SECTOR IN WHICH ORGANIZATION OPERATES (√ CHECK ONE):		
<input type="checkbox"/> Aerospace	<input type="checkbox"/>	<input type="checkbox"/> High Technology
<input type="checkbox"/> Construction	<input type="checkbox"/>	<input type="checkbox"/> Heavy Industry
<input type="checkbox"/> Consulting	<input type="checkbox"/>	<input type="checkbox"/> Light Industry
<input type="checkbox"/> Educational	<input type="checkbox"/>	<input type="checkbox"/> Manufacturing
<input type="checkbox"/> First Nations	<input type="checkbox"/>	<input type="checkbox"/> Marine Engineering and Naval Architecture
<input type="checkbox"/> Government Agency	<input type="checkbox"/>	<input type="checkbox"/> Natural Resources
<input type="checkbox"/> Government - Federal	<input type="checkbox"/>	<input type="checkbox"/> Operations
<input type="checkbox"/> Government - Municipal	<input type="checkbox"/>	<input type="checkbox"/> Research and Development
<input type="checkbox"/> Government - Provincial	<input type="checkbox"/>	<input type="checkbox"/> Utilities
<input type="checkbox"/> Healthcare	<input type="checkbox"/>	<input type="checkbox"/> Other:

FIGURE 9-3: OQM CERTIFICATION APPLICATION FORM

3. AREAS OF ENGINEERING AND GEOSCIENCE PRACTICE

Area of Engineering or Geoscience Practice	Organization Provides Engineering/Geoscience Products/Services in this Area (√)	Do you have a responsible APEGBC Professional ¹ on Active Staff ²
ENGINEERING		
Aeronautical		
Agricultural		
Biomedical		
Bioresource		
Biosystems		
Building Sciences		
Chemical		
Civil		
Computer		
Electrical		
Engineering Physics		
Environmental		
Food		
Forest		
Geological		
Geomatics		
Geotechnical		
Industrial		
Integrated		
Marine		
Mechanical		
Metallurgical		
Mining		
Naval Architectural		
Petroleum		
Process		
Software		
Structural		
Transportation		
Other		
GEOSCIENCE		
Geology		
Geophysics		
Environmental Geoscience		
Hydrogeology		
Hydrogeotechnical		
Other		

¹ Means professional engineer, professional geoscientist, licensees, including limited licensee, licensed to practice by APEGBC.

² Employees of the organization or those on contract who:

- Are APEGBC professionals, and
- Directly supervise and take professional responsibility for each practice area

FIGURE 9-3: OQM CERTIFICATION APPLICATION FORM

4. QUALITY MANAGEMENT REQUIREMENTS

Policies and procedures in the organization are consistent with the following quality management requirements as described in the OQM Manual:

Quality Management Requirement	Policies and Procedures are Consistent with the Requirement (✓)	If not applicable, explain why (e.g., organization does not practice structural engineering)
Using APEGBC Practice Guidelines related to Engineering or Geoscience Work Undertaken by Organization	<input type="checkbox"/> In Place <input type="checkbox"/> Not Applicable	
Retaining Engineering and/or Geoscience Documentation for Minimum 10 Years	<input type="checkbox"/> In Place <input type="checkbox"/> Not Applicable	
Carrying Out Documented Checks of Engineering and/or Geoscience Work	<input type="checkbox"/> In Place <input type="checkbox"/> Not Applicable	
Carrying Out Documented Independent Reviews of all Structural Designs	<input type="checkbox"/> In Place <input type="checkbox"/> Not Applicable	
Using Professional Seals Appropriately and Suitably	<input type="checkbox"/> In Place <input type="checkbox"/> Not Applicable	
Directly Supervising all Delegated Engineering and Geoscience Work	<input type="checkbox"/> In Place <input type="checkbox"/> Not Applicable	
Carrying Out Documented Field Reviews During Implementation or Construction Phases	<input type="checkbox"/> In Place <input type="checkbox"/> Not Applicable	

5. ATTESTATION

Sign and submit application. If using Notarius, application may be sent electronically with a digital signature

Please carefully consider the following attestation before signing it. Making inaccurate or misleading statements in this application may result in a complaint to APEGBC’s Investigation Committee and could result in a disciplinary hearing.

I, _____ am a senior APEGBC professional in
name of appointed senior APEGBC professional in organization

_____ and I have the authority to sign for the organization
name of organization

I confirm that, _____ has APEGBC professionals on active staff in each
name of organization

area of our engineering and/or geoscience practice and that we have documented and implemented policies and procedures consistent with all of the applicable *quality management requirements* listed above.

I confirm that if, _____ fails to pay the annual certification fee or if
name of organization

APEGBC revokes the organization’s OQM Certification that all OQM Certificates issued to the organization will be returned within 14 days and the organization will cease to represent itself as an OQM Certified organization

Name and Designation

APEGBC User ID (insert 6 digit #)

Title in Organization

Signature

AFFIX PROFESSIONAL
SEAL HERE

Date

FIGURE 9-3: OQM CERTIFICATION APPLICATION FORM

6. REQUIRED DOCUMENTS (to Accompany Initial Certification Submittal):

Provide **only** the following documents as PDF files. Do not send paper documents. Documents will be retained by APEGBC until the organization passes its next OQM audit.

- Copies of policies and procedures consistent with each quality management requirement
- Copies of documented processes for:
 - Retention of project documentation
 - Checking of engineering and geoscience work
 - Independent review of structural designs, if applicable
 - Field reviews

For the annual renewal application, resubmit required documents only where substantive changes have occurred. Otherwise, attest to those documents being substantively the same as in the previous submission.

Additional Office:

Mailing Address

Physical Address (if different)

Contact Person

Number of APEGBC Professionals at this location

Phone Number Email

Additional Office:

Mailing Address

Physical Address (if different)

Contact Person

Number of APEGBC Professionals at this location

Phone Number Email

Additional Office:

Mailing Address

Physical Address (if different)

Contact Person

Number of APEGBC Professionals at this location

Phone Number Email

If more offices, use additional pages as needed.

FIGURE 9-4: OQM AUDIT CHECKLIST

OQM CERTIFICATION REQUIREMENTS	YES (√)	NO (√)	NOT APPLI- CABLE (√)	REFERENCE OR COMMENTS
Section 2 – APEGBC Practice Guidelines				
Requirement: Explicitly require that APEGBC professionals comply with APEGBC Practice Guidelines related to engineering or geoscience work they undertake.				
• <i>Organization</i> communicates and reinforces this requirement				
• <i>Organization</i> periodically confirms that the requirement is being met				
• <i>Organization</i> can demonstrate that it has implemented policies and procedures consistent with this requirement				
• <i>Organization</i> can demonstrate that its <i>APEGBC professionals</i> are using and meeting the intent of <i>APEGBC Practice Guidelines</i> related to their engineering and geoscience work. (<i>Identify applicable APEGBC Guidelines and seek evidence of knowledge and use by the organization's APEGBC professionals.</i>)				
Section 3 – Retaining Project Documentation				
Requirement: A documented process is in place to retain complete project documentation for a minimum of 10 years after the project is completed or 10 years after the documentation for ongoing work is no longer in use.				
• <i>Organization</i> has a documented process in place to manage engineering or geoscience documentation				
• The process and related policies and procedures communicated to those involved in the engineering or geoscience projects or work				
• Engineering or geoscience documentation that must be retained is defined and/or identified				
• Specified retention period for engineering and geoscience documentation after the project is completed or the documentation for ongoing work is no longer in use is a minimum of 10 years				
• Engineering or geoscience project or work files are stored in a file structure that is consistent across projects or work				
• The <i>organization</i> uses one of the following options for the primary filing system:				
◦ <i>Organization</i> uses electronic media for its primary filing system				
◦ <i>Organization</i> uses hard copy for its primary filing system				
◦ <i>Organization</i> stores some types of documents in electronic media and other types of documents in hard copy, with a cross referencing guide as to which media contains which documents				

FIGURE 9-4: OQM AUDIT CHECKLIST

OQM CERTIFICATION REQUIREMENTS	YES (√)	NO (√)	NOT APPLICABLE (√)	REFERENCE OR COMMENTS
• Users are able to readily find and retrieve engineering and geoscience documentation for projects or work currently underway				
• <i>Organization</i> is able to demonstrate that it retains complete engineering or geoscience documentation for a minimum of 10 years				
• Retained project documentation is retrievable and legible (hard copy) or readable (electronic)				
• <i>Organization</i> can demonstrate the authenticity of documents that they have created or retained (e.g., title blocks, issue/revision records, version control, check-in and out procedures or other means)				
• <i>Organization</i> can demonstrate that they have controls in place to maintain the integrity or original intent of documents they retain (e.g., revision procedure, revision records, version control, professional seals or other means)				
• <i>Organization</i> can demonstrate that the documents they retain can be trusted (e.g., review procedures to check accuracy, completeness, correctness)				
• Controls are in place for documents received by the <i>organization</i>				
Section 4 – Documented Checking of Engineering and Geoscience Work				
Requirement: The <i>organization</i> is carrying out documented checks of engineering and geoscience work using a documented process appropriate to the risk associated with the work carried out				
• A documented process is in place to address documented checking of engineering and geoscience work appropriate to the level of risk of work undertaken				
• The documented process and related policies and procedures are communicated to those involved in the engineering or geoscience projects or work				
• Input requirements for engineering and geoscience work are confirmed and recorded before work is carried out				
• Input data for engineering and geoscience work is checked before the data is used in engineering or geoscience work and a record of the check is retained				
• Where needed or required, concept reviews or independent reviews are carried out				
• Engineering or geoscience calculations are checked and a record of the check is kept				

FIGURE 9-4: OQM AUDIT CHECKLIST

OQM CERTIFICATION REQUIREMENTS	YES (√)	NO (√)	NOT APPLICABLE (√)	REFERENCE OR COMMENTS
<ul style="list-style-type: none"> Engineering and geoscience work and documentation is checked periodically, as required to suit the work, and before it is sealed and delivered, and a record of the check is kept 				
<ul style="list-style-type: none"> Qualified checkers are performing the checks 				
<ul style="list-style-type: none"> Controls are in place for the use of self checks 				
<ul style="list-style-type: none"> Records of checks include who carried out the check, when, issues of substance identified and any resulting correction or corrective action taken 				
<p>Section 5 – Independent Reviews of Structural Design Requirement: <i>APEGBC professionals in the organization are having independent review of structural designs they prepare or directly supervise carried out as required to meet the Bylaw and respective Quality Management Guidelines.</i></p>				
<p>Does the <i>organization</i> prepare structural designs? If no, go to Section 6.</p>				
<p>Do all of the structural designs prepared by the <i>organization</i> relate to one- and two-family homes that fall under Part 9 of the <i>BC Building Code</i> and have a lateral resistance that meets <i>CWC Engineering Guide for Wood Frame Construction</i>? If yes, go to Section 6.</p>				
<ul style="list-style-type: none"> <i>Organization</i> has a documented process in place to conduct independent review of structural designs 				
<ul style="list-style-type: none"> Process and related policies and procedures are communicated to those involved in structural design 				
<ul style="list-style-type: none"> Level of detail and extent of reviews are based on the assessed risk 				
<ul style="list-style-type: none"> <i>Organization</i> can demonstrate that independent reviews of structural designs are taking place before documents are issued for construction 				
<ul style="list-style-type: none"> Where <i>organizations</i> carry out repetitive designs of individual structural components, the <i>organization</i> can demonstrate that independent reviews of the initial design are conducted, and at appropriate intervals in the future as deemed necessary 				
<ul style="list-style-type: none"> <i>APEGBC professionals</i>, responsible for primary structural systems, are confirming that specialty components designed by others are in general conformance to the design concept and general arrangement of the primary system 				
<ul style="list-style-type: none"> Independent structural reviewers are appropriately qualified and have not been involved in preparing designs they review 				

FIGURE 9-4: OQM AUDIT CHECKLIST

OQM CERTIFICATION REQUIREMENTS	YES (√)	NO (√)	NOT APPLI- CABLE (√)	REFERENCE OR COMMENTS
<ul style="list-style-type: none"> Documentation provided by the <i>APEGBC professional of record</i> to the independent reviewer is as required by the <i>Quality Management Guidelines – Documented Independent Review of Structural Designs</i> 				
<ul style="list-style-type: none"> Independent reviews include: 				
<ul style="list-style-type: none"> <ul style="list-style-type: none"> design criteria, loads, including loads imposed by components designed by other disciplines and loads from adjacent structures, and performance requirements, 				
<ul style="list-style-type: none"> <ul style="list-style-type: none"> geotechnical requirements and material properties, 				
<ul style="list-style-type: none"> <ul style="list-style-type: none"> concept and integrity of the gravity and lateral load resisting system, 				
<ul style="list-style-type: none"> <ul style="list-style-type: none"> continuity of load paths for both gravity and lateral loads, 				
<ul style="list-style-type: none"> <ul style="list-style-type: none"> structural plans and supporting documents to determine whether they are sufficient to identify the essential components of the structural system and provide sufficient information to guide the construction of the structure, and 				
<ul style="list-style-type: none"> <ul style="list-style-type: none"> where appropriate, performing design calculations on a representative sample of structural elements to determine whether the analysis, design and detailing generally comply with the appropriate codes and standards 				
<ul style="list-style-type: none"> Independent reviewers discuss concerns with <i>APEGBC professionals of record</i>, as applicable 				
<ul style="list-style-type: none"> Independent reviewers are providing a formal record of their independent reviews to the <i>APEGBC professional of record</i> highlighting any concerns 				
<ul style="list-style-type: none"> Where independent reviewers note significant concerns, they request that the <i>APEGBC professional of record</i> revises and resubmits the design documents for independent review 				
<ul style="list-style-type: none"> <i>APEGBC professionals of record</i> are adequately resolving concerns noted in the independent reviews and documenting the rationale for their actions 				
<ul style="list-style-type: none"> Adequate records of independent reviews and resulting actions are retained 				

FIGURE 9-4: OQM AUDIT CHECKLIST

OQM CERTIFICATION REQUIREMENTS	YES (√)	NO (√)	NOT APPLI-CABLE (√)	REFERENCE OR COMMENTS
Section 6 – Use of APEGBC Seal				
Requirement: <i>APEGBC professionals</i> employed by the <i>organization</i> are sealing all engineering or geoscience documents prepared by them or under their direct supervision before they deliver the documents to others who will rely on the information contained in them.				
• <i>Organization</i> has policies and procedures in place for managing the use of professional seals				
• Policies and procedures are documented and communicated to those involved in document preparation				
• Documents that require sealing are being sealed by <i>APEGBC professionals</i> acting in their professional capacity or directly supervising the work contained in the documents				
• Documents are being sealed by the <i>APEGBC professional</i> with the lowest level of direct professional responsibility for the work (see definition of <i>APEGBC professional of record</i>)				
• Documents are being sealed, signed and dated in an appropriate location				
• Decisions about when to seal documents are being made by the <i>APEGBC professional of record</i>				
• Before sealing a document, the <i>APEGBC professional of record</i> is reviewing the document and has accepted professional responsibility for its content				
• Master documents that can be altered and reproduced are NOT being sealed unless an electronic seal with digital certification is used				
• Type of seal used in <i>organization</i> :				
◦ Hard copies of documents are sealed using ink seals, signatures and dates				
◦ Digital copies of documents are sealed with an electronic version of the seal and a digital certificate to validate the electronic seal				
• Applied scans of seals, stick on seals, electronic seals not validated by a digital certificate and other unapproved versions of seals are not being used				
• Where electronic seals are being used, they have been purchased from <i>APEGBC</i>				
• Where digital certificates are being used, the service provider has been independently confirmed to be meeting the <i>APEGBC</i> best practices, or is approved by <i>APEGBC</i>				

FIGURE 9-4: OQM AUDIT CHECKLIST

OQM CERTIFICATION REQUIREMENTS	YES (√)	NO (√)	NOT APPLICABLE (√)	REFERENCE OR COMMENTS
• Record drawings that include design changes and as-constructed or as-implemented information supplied by others are only being sealed when a suitable declaration has been included on the drawing				
• Engineering and geoscience decisions or opinions sent in the body of e-mails is followed up with a sealed document				
• APEGBC professionals are only sealing documents prepared in languages in which they are fluent				
• Sealed documents (whether hard copy and digital) are retained as records				
Section 7 – Direct Supervision				
Requirement: APEGBC professionals of record are directly supervising any engineering or geoscience work they delegate.				
• Organization has policies and procedures in place for managing the delegation of engineering and geoscience work				
• Policies and procedures are documented and communicated to those involved in delegating or carrying out delegated work				
• APEGBC professionals are actively involved in work they delegate by:				
◦ having knowledge of all stages of the project or work				
◦ having knowledge of the development or history of the project or work				
◦ providing input on earlier drafts				
◦ reviewing particular elements in earlier stages				
◦ being regularly consulted throughout the project or work				
• APEGBC professionals are providing appropriate supervision by:				
◦ being located in the same workplace as or regularly communicating with the subordinate				
◦ being available to the subordinate during the project or work				
◦ periodically reviewing the subordinate’s work				
◦ being consulted throughout the project or work and not just at the final stage				
• APEGBC professionals are adequately supervising field reviews by:				

FIGURE 9-4: OQM AUDIT CHECKLIST

OQM CERTIFICATION REQUIREMENTS	YES (√)	NO (√)	NOT APPLI- CABLE (√)	REFERENCE OR COMMENTS
◦ assessing circumstances to determine if delegating field reviews is appropriate				
◦ assessing complexity and critical nature of field review to determine whether the subordinate can provide the required level of quality and accuracy				
◦ assessing whether the subordinate has the required level of training and experience for the field review				
◦ providing careful instructions to those who carried out the field reviews about the required effort, reporting detail and specific aspects of the construction activities to be reviewed				
◦ giving instructions including what to confirm, test, record and report				
◦ being involved in making any engineering or geoscience decisions or judgments required in the field				
◦ reviewing and following up on field reports				
• <i>APEGBC professionals</i> are involved in all engineering and geoscience decisions by:				
◦ being available to answer subordinate's questions about decisions				
◦ being aware of relevant input requirements, design criteria, methods of analysis, selection of resource materials and systems, field conditions, engineering and geoscience methodologies being applied, economics of alternate solutions, environmental considerations, and other relevant considerations				
◦ reviewing each engineering and geoscience decision and the reasons for making it				
• <i>APEGBC professionals</i> are providing supervision appropriate to the experience of the subordinate by:				
◦ assessing experience levels and setting up an appropriate supervision plan				
◦ assigning broader or multi-stepped tasks with decreasing frequency of reviews as subordinate's experience increases				
◦ being available to answer subordinate's questions and provide direction				

FIGURE 9-4: OQM AUDIT CHECKLIST

OQM CERTIFICATION REQUIREMENTS	YES (√)	NO (√)	NOT APPLI- CABLE (√)	REFERENCE OR COMMENTS
Section 8 – Field Reviews				
Requirement: <i>APEGBC professionals</i> are carrying out documented field reviews during the implementation or construction phase, based on a documented process, to confirm conformance with the concepts or intent represented in the relevant engineering or geoscience documents.				
• The organization's <i>APEGBC professionals</i> are using a documented process to carry out field reviews				
• <i>APEGBC professionals</i> are not predetermining the number of field reviews required				
• Appropriate criteria including level of risk is being used by <i>APEGBC professionals</i> to assess the extent of field reviews				
• Field reviews appropriate to the work are being carried out during the implementation or construction				
• Where possible, field reviews are being carried out by the <i>APEGBC professional of record</i> or someone under his or her direct supervision				
• <i>APEGBC professionals</i> have appropriate documented protocols in place for situations where the client, owner or employer decides to use someone other than the <i>APEGBC professional of record</i> to carry out field review				
• Field reviews are occurring at critical points in the implementation or construction				
• Where critical work has been covered up before a field review, <i>APEGBC professionals</i> are requesting that it be uncovered or advising the client, owner or employer of the consequences of or rationale for not viewing the work, and noting it in the file				
• <i>APEGBC professionals</i> are advising their client, the owner or the employer when more field reviews are required and why				
• <i>APEGBC professionals</i> are advising their client, the owner or the employer of the consequences of not carrying out the added field reviews and taking appropriate action				
• Observations made during field reviews are being documented and communicated to those responsible for the implementation or construction, in writing, at the time of the review				
• Field reviewers are advising what must be rectified or replaced, but are not telling those responsible for the implementation or construction how to rectify the problem				



FIGURE 9-4: OQM AUDIT CHECKLIST

OQM CERTIFICATION REQUIREMENTS	YES (√)	NO (√)	NOT APPLI- CABLE (√)	REFERENCE OR COMMENTS
<ul style="list-style-type: none"> • Nonconforming work observed in field reviews is being tracked until the work is rectified as directed by the field reviewer 				
<ul style="list-style-type: none"> • All field reviews are being documented 				
<ul style="list-style-type: none"> • A procedure is in place, and being implemented, for the creation and storage of any photographic or video records 				
<ul style="list-style-type: none"> • Field review documentation is being retained as a record 				



FIGURE 9-5: EXAMPLES OF OQM APPLIED IN VARIOUS SECTORS

TYPE OF ORGANIZATION	CONSULTING	MANUFACTURING	TECHNOLOGY	REGULATORY AUTHORITY
Description of the Organization's Role	Providing professional engineering or professional geoscience work on client projects	Preparing engineering or geoscience work for manufactured products or manufacturing processes	Engineering or geoscience software development by <i>APEGBC professionals</i>	Review, acceptance or approval of engineering or geoscience work submitted to the authority
Section 2 – APEGBC Practice Guidelines	Require that all <i>APEGBC professionals</i> employed by the <i>organization</i> comply with the intent of <i>APEGBC Practice Guidelines</i> related to the engineering or geoscience work they undertake	Require that all <i>APEGBC professionals</i> employed by the <i>organization</i> comply with the intent of <i>APEGBC practice guidelines</i> related to the engineering or geoscience work they undertake	Require that all <i>APEGBC professionals</i> employed by the <i>organization</i> comply with the intent of <i>APEGBC practice guidelines</i> related to the engineering or geoscience work they undertake	Require that <i>APEGBC professionals</i> , acting for, or submitting engineering or geoscience documents to, the authority, be familiar and consistent with the intent of <i>APEGBC practice guidelines</i> that are applicable to the work being submitted to the authority for review, acceptance or approval
Section 3 – Retaining Project Documentation	Establish and implement a records management system to retain engineering or geoscience project-related documentation	Establish and implement a records management system to retain documentation related to the product and/or ongoing engineering or geoscience work	Establish and implement a records management system to retain documentation related to engineering or geoscience work	Establish and implement a records management system to retain documentation related to the submittal, review, acceptance and/or approval of engineering or geoscience work
Section 4 – Documented Checking Process	Establish and implement a documented checking process that indicates checks required throughout engineering and geoscience projects undertaken by the <i>organization</i>	Establish and implement a documented checking process that indicates checks required of ongoing engineering and geoscience work carried out by the <i>organization</i>	Establish and implement a documented checking process that indicates checks required of work carried out by <i>APEGBC professionals</i> employed by the <i>organization</i>	Establish and implement a documented checking process of reviews carried out by <i>APEGBC professionals</i> acting for the authority or, where concerns arise in submissions from <i>APEGBC professionals</i> , request evidence of their checks of the work including who carried out checks and when
Section 5 – Independent Review of Structural Designs	Establish and implement independent reviews of structural designs, if any, carried out by the <i>organization</i>	Establish and implement independent reviews of structural designs, if any, carried out by the <i>organization</i>	Probably not applicable	Confirm that structural designs included in submittals to the authority have undergone required independent structural reviews

FIGURE 9-5: EXAMPLES OF QM APPLIED IN VARIOUS SECTORS

TYPE OF ORGANIZATION	CONSULTING	MANUFACTURING	TECHNOLOGY	REGULATORY AUTHORITY
Description of the Organization's Role	Providing professional engineering or professional geoscience work on client projects	Preparing engineering or geoscience work for manufactured products or manufacturing processes	Engineering or geoscience software development by <i>APEGBC professionals</i>	Review, acceptance or approval of engineering or geoscience work submitted to the authority
Section 6 – Use of Seal	Establish policies and procedures to have <i>APEGBC professionals</i> employed by the <i>organization</i> appropriately seal professional documents that they prepare or directly supervise	Establish policies and procedures to have <i>APEGBC professionals</i> employed by the <i>organization</i> appropriately seal professional documents that they prepare or directly supervise	Establish policies and procedures to have <i>APEGBC professionals</i> employed by the <i>organization</i> appropriately seal professional documents that they prepare or directly supervise	Require that <i>APEGBC professionals</i> acting for the authority or submitting engineering or geoscience documents to the authority meet the requirements regarding the use of professional seals
Section 7 – Direct Supervision	Establish policies and procedures to have <i>APEGBC professionals</i> employed by the <i>organization</i> directly supervise any engineering or geoscience work that they delegate	Establish policies and procedures to have <i>APEGBC professionals</i> employed by the <i>organization</i> directly supervise any engineering or geoscience work that they delegate	Establish policies and procedures to have <i>APEGBC professionals</i> employed by the <i>organization</i> directly supervise any engineering or geoscience work that they delegate	Require that the delegation of engineering or geoscience work by <i>APEGBC professionals</i> acting for the authority meets the requirement of being under the <i>APEGBC professional's</i> direct supervision. Where concerns arise with submissions to the authority, request records to confirm submissions prepared by non- <i>APEGBC professionals</i> have been prepared under appropriate direct supervision
Section 8 – Field Review	Establish and implement documented field reviews of engineering and geoscience projects during construction by or under the direct supervision of the <i>APEGBC professional of record</i> that may involve observations, surveys, testing and other actions to assess whether the construction substantially complies with the engineering or geoscience intent or concept	Establish and implement field reviews of the implementation by or under the direct supervision of the <i>APEGBC professional of record</i> that may involve inspection, testing, review of quality control processes or other steps taken to assess whether the implementation substantially complies with the engineering or geoscience intent or concept	Establish and implement a product testing process to confirm that software substantially complies with the engineering or geoscience intent or concept	Where relevant, require that <i>APEGBC professionals</i> , acting for the authority or submitting engineering or geoscience documents to the authority, meet the requirements regarding carrying out documented field reviews as evidenced by field review reports

APPENDIX A

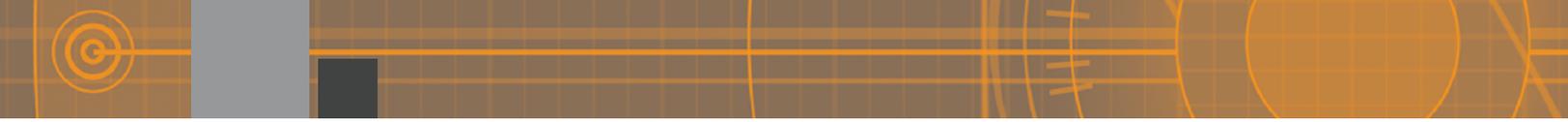
APEGBC Quality Management Practice Guidelines

The Practice Guidelines prepared for the *quality management requirements* in the *Act* and *Bylaws* have been included here for the convenient reference of those using the OQM Manual. They are directed at *APEGBC professionals* and set out the standard of practice expected of them. They are not intended nor do they provide any direction to *organizations*.

The Practice Guidelines included in Appendix A are as follows:

- APEGBC Quality Management Guidelines – Direct Supervision
- APEGBC Quality Management Guidelines – Documented Checks of Engineering and Geoscience Work
- APEGBC Quality Management Guidelines – Documented Field Reviews During Implementation or Construction
- APEGBC Quality Management Guidelines – Documented Independent Review of Structural Designs
- APEGBC Quality Management Guidelines – Retention of Project Documentation
- APEGBC Quality Management Guidelines – Use of the APEGBC Seal

Digital copies are available at apeg.bc.ca/guidelines.



NOTES:

A series of horizontal orange lines providing a space for writing notes. The lines are evenly spaced and extend across the width of the page.



