

ORGANIZATIONAL  
QUALITY MANAGEMENT  
PROGRAM



ENGINEERS &  
GEOSCIENTISTS  
BRITISH COLUMBIA

# OQM MANUAL

VERSION 2.0  
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# PREFACE

Engineers and Geoscientists BC introduced the Organizational Quality Management (OQM) Program in recognition of the significant influence that Organizations have on the practice of the professions by the Engineering/Geoscience Professionals they employ.

The OQM Program, as documented in this *OQM Manual*, aims to address that influence and provide guidance for professional practice Quality Management at the organizational level for Engineering/Geoscience Professionals. 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. Engineering/Geoscience 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 Engineers and Geoscientists BC's Professional Renewal Program was that Quality Management policies of Organizations employing Engineering/Geoscience Professionals have a significant impact on the practice of the professions. In response, Engineers and Geoscientists BC 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 Engineering/Geoscience Professionals have under the *Engineers and Geoscientists Act (Act)* and Bylaws. The pilot OQM Program evaluated nine Organizations in the high tech, consulting, construction, government, manufacturing, and utilities sectors.

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

In creating the OQM Program, Engineers and Geoscientists BC has **not** created a Quality Management System for Organizations. Instead, this *OQM 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 Engineering/Geoscience 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.

Engineers and Geoscientists BC will issue an OQM certificate to Organizations that have implemented policies and procedures consistent with these requirements:

- Apply relevant Engineers and Geoscientists BC professional practice guidelines (*OQM Manual*, Section 2)

- Retain complete project documentation (*OQM Manual*, Section 3)
- Carry out documented checks of engineering and geoscience work using a written quality control process (*OQM Manual*, Section 4)
- Carry out documented independent review of structural designs prior to construction (*OQM Manual*, Section 5)
- Appropriate use of seal (*OQM Manual*, Section 6)
- Have Engineering/Geoscience Professionals directly supervise engineering or geoscience work that they delegate to others (*OQM Manual*, Section 7)
- Carry out documented field reviews during implementation or construction (*OQM Manual*, 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, Engineering/Geoscience Professionals and the Organization.

For your convenience, **Section 10: Appendix** in this manual includes links to the Engineers and Geoscientists BC Quality Management guidelines that are available for download from the Engineers and Geoscientists BC website.

**Table P-1** explains the difference between the *OQM Manual* and the Quality Management guidelines.

*TABLE P-1: Differentiating between the OQM Manual and the Quality Management Guidelines*

CATEGORIES FOR COMPARISON	OQM MANUAL	QUALITY MANAGEMENT GUIDELINES
<b>PURPOSE</b>	<ul style="list-style-type: none"> <li>• Provides resources to any Organization wishing to support its Engineering/Geoscience Professionals by implementing policies and procedures consistent with the Quality Management requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Provides standards of practice for complying with the Quality Management requirements</li> </ul>
<b>AUDIENCE</b>	<ul style="list-style-type: none"> <li>• Organizations that employ Engineering/Geoscience Professionals</li> </ul>	<ul style="list-style-type: none"> <li>• Engineering/Geoscience Professionals</li> </ul>
<b>DIRECTION</b>	<ul style="list-style-type: none"> <li>• Voluntary</li> </ul>	<ul style="list-style-type: none"> <li>• Mandatory to follow intent</li> </ul>
<b>RELATIONSHIP</b>	<ul style="list-style-type: none"> <li>• Collective, with its own terminology; all nine sections are written to complement each other</li> </ul>	<ul style="list-style-type: none"> <li>• Standalone documents with their own definitions</li> </ul>
<b>CONTENT</b>	<ul style="list-style-type: none"> <li>• Why and what to do with guidance about how to comply with the <i>OQM Manual</i></li> </ul>	<ul style="list-style-type: none"> <li>• Why and what to do, but not how to do it</li> </ul>
<b>OUTCOME OF USE</b>	<ul style="list-style-type: none"> <li>• OQM certification and exemption from random practice reviews for Engineering/Geoscience Professionals employed by OQM-certified Organizations</li> </ul>	<ul style="list-style-type: none"> <li>• Meeting the Quality Management requirements as stated in the <i>Act</i> and Bylaws</li> </ul>
<b>OUTCOME OF FAILURE TO USE</b>	<ul style="list-style-type: none"> <li>• No OQM certification and possible market disadvantage</li> </ul>	<ul style="list-style-type: none"> <li>• Potential for disciplinary action against Engineering/Geoscience Professionals</li> </ul>

## WHY IMPLEMENT OQM IN YOUR ORGANIZATION?

The Organization gains better Quality Management, customer satisfaction, market recognition, and improved efficiency, and saves time, effort, and money, as its Engineering/Geoscience Professionals are exempt from random selection for practice reviews.

## CONTACT INFORMATION AND COPIES OF THE MANUAL

For more information about the OQM Program or certification, contact Engineers and Geoscientists BC, Organizational Quality Management department at the following numbers.

Copies of the *OQM Manual* are available from the Engineers and Geoscientists BC website ([www.egbc.ca/oqm-manual](http://www.egbc.ca/oqm-manual)).

For printed versions of the manual, contact Engineers and Geoscientists BC.

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# ABBREVIATIONS

ABBREVIATION	TERM
BC	British Columbia
CWC	Canadian Wood Council
EIT	Engineer-in-Training
GIT	Geoscientist-in-Training
OQM	Organizational Quality Management
QM	Quality Management



# DEFINED TERMS

For the purposes of the *OQM Manual* and the Engineers and Geoscientists BC OQM Program, the following terms have been defined and are capitalized throughout this manual.

TERM	DEFINITION
<b>Act</b>	<i>Engineers and Geoscientists Act</i> [RSBC 1996] Chapter 116.
<b>Active Staff</b>	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.
<b>Bylaws</b>	The Bylaws of Engineers and Geoscientists BC made under the <i>Act</i> .
<b>Engineers and Geoscientists BC</b>	The Association of Professional Engineers and Geoscientists of the Province of British Columbia, also operating as Engineers and Geoscientists BC.
<b>Engineering Professional</b>	Professional engineers, including licensees who are licensed to practice by Engineers and Geoscientists BC.
<b>Engineering/Geoscience Professional(s)</b>	Professional engineers, professional geoscientists, and licensees who are licensed to practice by Engineers and Geoscientists BC.
<b>OQM Organization</b>	An Organization that has voluntarily implemented policies and procedures consistent with the Quality Management requirements and been granted OQM certification by Engineers and Geoscientists BC.
<b>Organization</b>	Any firm, corporation, partnership, government agency, sole proprietor, or other legal entity that employs Engineering/Geoscience Professionals and provides products and/or services requiring the application of professional engineering and/or professional geoscience.
<b>Professional of Record</b>	The Engineering/Geoscience Professional or 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 Engineering/Geoscience Professional to alter or revise the engineering or geoscience content in the master documents.

TERM	DEFINITION
<b>Quality Management</b>	All the activities intended to bring about the desired level of quality, which can include those related to the Quality Management Requirements under the <i>Act</i> and Bylaws.
<b>Quality Management Requirements</b>	<p>The Quality Management obligations required of Engineering/Geoscience Professionals under the <i>Act</i> and Bylaws, and around which the OQM Program and the <i>OQM Manual</i> have been developed, as listed below:</p> <ul style="list-style-type: none"> <li>• Application of the relevant Engineers and Geoscientists BC professional practice guidelines: <i>Act</i>, s. 4.1(2)(b) and Bylaw 11(e)(4)(h) (<i>OQM Manual</i>, Section 2)</li> <li>• Retention of complete project documentation: Bylaw 14(b)(1) (<i>OQM Manual</i>, Section 3)</li> <li>• Documented checks using a written quality control process: Bylaw 14(b)(2) (<i>OQM Manual</i>, Section 4)</li> <li>• Documented independent review of structural designs: Bylaw 14(b)(4) (<i>OQM Manual</i>, Section 5)</li> <li>• Use of seal: <i>Act</i>, s. 20(9) (<i>OQM Manual</i>, Section 6)</li> <li>• Application of direct supervision: <i>Act</i>, ss. 1(1), 2(6), 2(7), and 20(9) (<i>OQM Manual</i>, Section 7)</li> <li>• Documented field reviews of projects during implementation or construction: Bylaw 14(b)(3) (<i>OQM Manual</i>, Section 8)</li> </ul>
<b>Quality Management System</b>	The organizational structure, procedures, processes, and resources needed to implement Quality Management. The <i>OQM Manual</i> 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 Engineering/Geoscience Professionals must meet under the <i>Act</i> and Bylaws.

# 1.0 INTRODUCTION TO THE OQM PROGRAM AND OQM MANUAL

## 1.1 INTRODUCTION

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### 1.1.1 RESPONSIBILITIES UNDER THE *ACT* AND BYLAWS

Engineering/Geoscience Professionals are employed in their professional capacity in a variety 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 what sector they work in, Engineering/Geoscience Professionals 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, including:

- following the standards of practice established under the authority of the *Act*, which is one of the principal objectives of Engineers and Geoscientists BC; 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 Engineers and Geoscientists BC Code of Ethics Bylaw 14(a)(1).

To support the fulfillment of these obligations, the *Act* and Bylaws include Quality Management-related provisions, which Engineering/Geoscience Professionals must address.

### 1.1.2 QUALITY MANAGEMENT REQUIREMENTS

Consistent with the Engineering/Geoscience Professional's duty to be professionally responsible and accountable for his or her engineering or geoscience work, the Engineering/Geoscience Professional remains the one answerable for addressing the Quality Management Requirements contained in the *Act* and Bylaws.

The Quality Management Requirements include these Quality Management obligations:

1. Application of the relevant Engineers and Geoscientists BC professional practice guidelines: *Act*, s. 4.1(2)(b) and Bylaw 11 (e)(4)(h) (*OQM Manual*, Section 2)
2. Retention of complete project documentation: Bylaw 14(b)(1) (*OQM Manual*, Section 3)

3. Documented checks using a written quality control process: Bylaw 14(b)(2) (*OQM Manual*, Section 4)
4. Documented independent review of structural designs: Bylaw 14(b)(4) (*OQM Manual*, Section 5)
5. Use of seal: *Act*, s. 20(9) (*OQM Manual*, Section 6)
6. Application of direct supervision: *Act*, ss. 1(1), 2(6), 2(7), and 20(9) (*OQM Manual*, Section 7)
7. Documented field reviews of projects during implementation or construction: Bylaw 14(b)(3) (*OQM Manual*, Section 8)

### 1.1.3 PROFESSIONAL PRACTICE GUIDELINES AND QUALITY MANAGEMENT GUIDELINES

The following two types of guidelines support these requirements:

- **Professional practice guidelines** are discussed in Section 2 of this manual and relate to Requirement 1 above. Professional practice guidelines describe the appropriate level of professional practice to be met when carrying out a specific professional engineering or professional geoscience activity.

The professional practice guidelines are available from the Engineers and Geoscientists BC website ([www.egbc.ca/guidelines](http://www.egbc.ca/guidelines)).

- **Quality Management Guidelines** are covered in Sections 3 to 8 of this manual and relate to Requirements 2 to 7 above. Quality Management guidelines address obligatory Quality Management Requirements as set out in the *Act* and Bylaws that apply to any engineering and geoscience work.
- The Quality Management guidelines are available from the Engineers and Geoscientists BC website ([www.egbc.ca/Quality-Management-Guidelines](http://www.egbc.ca/Quality-Management-Guidelines)).

## 1.2 PURPOSE OF THE OQM PROGRAM AND MANUAL

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### 1.2.1 MEETING QUALITY MANAGEMENT REQUIREMENTS

To ensure that these Quality Management Requirements are met, an Engineering/Geoscience Professional's practice must embrace a basic level of quality assurance. Engineers and Geoscientists BC recognizes that quality assurance in professional practice is influenced at the following two fundamental levels:

1. At an individual level, through the practice of the professions by Engineering/Geoscience Professionals.
2. At an Organizational level, through policies and procedures implemented by Organizations employing Engineering/Geoscience Professionals that directly impact their professional practice.

Engineers and Geoscientists BC has several tools in place to address the individual level of influence on professional practice identified above. These regulatory quality assurance programs, which focus on the individual practitioner, are both proactive (practice reviews, professional practice guidelines, and continuing professional development) and reactive (discipline).

## 1.2.2 THE GOAL OF THE OQM PROGRAM

With the OQM Program, Engineers and Geoscientists BC 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 Engineering/Geoscience Professionals they employ.

While the OQM Program is voluntary, Engineers and Geoscientists BC established the 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 also allow Engineers and Geoscientists BC 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 *OQM Manual* are resources for any Organization that wants to support its Engineering/Geoscience Professionals by implementing policies and procedures consistent with the seven basic Quality Management Requirements listed above. Implementing such policies and procedures does not place the obligation for complying with the Quality Management Requirements on the Organization. Engineering/Geoscience Professionals themselves remain responsible for complying with the Quality Management Requirements and other obligations as set out in the *Act* and Bylaws.

## 1.2.3 RESTRICTIONS AND LICENSING OF TITLES

Organizations should be aware that the *Act* restricts the practice of professional engineering and professional geoscience in BC to individuals who are registered or licensed to practice by Engineers and Geoscientists BC.

It also restricts the use of the titles ‘professional engineer’ and ‘professional geoscientist’ in BC to Engineering/Geoscience Professionals.

In addition, Organizations in BC cannot use restricted words in the Organization’s name (e.g., engineering, geoscience) unless they have Engineering/Geoscience Professionals on their Active Staff who assume responsibility for the engineering and geoscience carried out by the Organization.

## 1.3 APPLICATION OF THE OQM PROGRAM AND USE OF THE OQM MANUAL

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### 1.3.1 ORGANIZATION SECTORS

The OQM Program applies to all Organizations that employ Engineering/Geoscience 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 the following:

- Aerospace
- Construction
- Consulting
- Educational
- First Nations
- Government
- Healthcare
- Manufacturing
- High technology
- Light and heavy industry
- Marine engineering and naval architecture
- Natural resources
- Operations
- Research and development
- Utilities

### **1.3.2 ACTIVITIES REQUIRING QUALITY MANAGEMENT**

These obligations apply to Engineering/Geoscience Professionals in all sectors where their work in their professional capacity may apply to or be used in the following activities:

- 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 Engineering/Geoscience 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

### **1.3.3 WHAT DOES IT MEAN FOR POLICIES AND PROCEDURES TO BE CONSISTENT WITH THE OQM REQUIREMENTS**

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 Engineering/Geoscience 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:

- Using the policies and procedures they have already established that are consistent with the Quality Management Requirements
- Adapting the policies and procedures they have in place to be consistent with the Quality Management Requirements

- Creating new policies and procedures that are consistent with the Quality Management Requirements
- Adopting the Engineers and Geoscientists BC *OQM Manual* as an umbrella policy document under which the Organization may create standard operating procedures or other Organization-specific documents

Following are a few examples of potential policies and procedures for using OQM to help meet Quality Management Requirements:

- 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 Engineering/Geoscience Professionals must meet the intent of any Engineers and Geoscientists BC professional 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 Engineering/Geoscience Professionals having appropriate experience in designing structures of a similar type and scale, and who are not involved in preparing the design.

## 1.4 STRUCTURE OF THE OQM MANUAL

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The *OQM Manual* is structured according to the seven Quality Management Requirements set out in the *Act* and Bylaws. Each section includes the following subsections:

- **Purpose:** Introduces the section and links it to its related Quality Management guideline (see **Table P-1** in the Preface for explanations of the differences between the *OQM Manual* and the related Quality Management guidelines)
- **Guidance:** Describes what is expected of the OQM Organization (i.e., policies and procedures consistent with the requirements)
- **Resources:** Provides resources that may be used to develop policies and procedures consistent with the Quality Management Requirements, such as the following:
  - Flowcharts for processes
  - Tables for decisions
  - Checklists for reminders
  - Generic procedures
  - Other tools as appropriate

## 1.5 ADDITIONAL BENEFITS OF THE OQM PROGRAM

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### 1.5.1 OVERALL BENEFITS OF THE OQM PROGRAM

The OQM Program will benefit Organizations and the Engineering/Geoscience Professionals they employ in the following ways:

- Helping Engineering/Geoscience Professionals fulfill their obligations under the Code of Ethics
- Supporting Engineering/Geoscience 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 Engineering/Geoscience 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

### 1.5.2 HOW OQM ORGANIZATIONS WILL BE RECOGNIZED

To be certified by Engineers and Geoscientists BC, OQM Organizations are required to demonstrate the following:

1. The Organization has Active Staff for each engineering or geoscience practice area in which the Organization operates.
2. The Organization has policies and procedures that are consistent with the Quality Management Requirements, and the Organization is using:
  - already-established policies and procedures that are consistent with the Quality Management Requirements;
  - policies and procedures adapted to be consistent with the Quality Management Requirements and uses them;
  - new policies and procedures that are consistent with the Quality Management Requirements; or
  - the Engineers and Geoscientists BC *OQM Manual* as an umbrella policy document under which the Organization has created standard operating procedures or other Organization-specific documents.

Once an Organization has demonstrated that the policies and procedures it has in place are consistent with the Quality Management Requirements, the Organization will receive OQM certification.

Details of the OQM certification process may be found in **Section 9** of this manual.

## 1.6 CONTINUAL IMPROVEMENT

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Engineers and Geoscientists BC recognizes that continual improvement is fundamental to any quality program and welcomes feedback from Engineering/Geoscience Professionals and the Organizations that employ them about how to improve the OQM Program and the *OQM Manual*.

As part of its commitment to the continual improvement of this program, Engineers and Geoscientists BC will undertake the following activities:

- Collect input from practice reviews, OQM certification audits, and users of the OQM Program
- 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)

Engineers and Geoscientists BC 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.

## 1.7 ACKNOWLEDGEMENTS

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### 1.7.1 OQM COMMITTEE MEMBERS

Engineers and Geoscientists BC thanks the following members for their role on the OQM Committee and the development of the OQM Program and the *OQM 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, MCIM, AMC Mining Consultants (Canada) Pty Ltd.
- Ian Stewart, PhD, P.Eng., Consulting Engineers of British Columbia
- Greg Thorne, P.Eng., Cascade Aerospace Inc.



# 2.0 ENGINEERS AND GEOSCIENTISTS BC PROFESSIONAL PRACTICE GUIDELINES

## 2.1 PURPOSE

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Engineering/Geoscience Professionals are required to comply with the intent of Engineers and Geoscientists BC professional practice guidelines related to the engineering or geoscience work they undertake.

One of the three objectives of Engineers and Geoscientists BC, stated in the *Act* is “to establish, maintain, and enforce standards for the qualifications and practice of its members and licensees.” Professional practice guidelines are one means by which Engineers and Geoscientists BC 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 Engineers and Geoscientists BC 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 Engineers and Geoscientists BC professional practice guidelines by the Engineering/Geoscience Professionals they employ.

## 2.2 GUIDANCE

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### 2.2.1 WHAT ARE ENGINEERS AND GEOSCIENTISTS BC PROFESSIONAL PRACTICE GUIDELINES

Professional practice guidelines describe standards of practice and may be used to establish the standard of care<sup>1</sup> to be met in a given area by an Engineering/Geoscience Professional exercising due diligence in carrying out engineering or geoscience work in that area.

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<sup>1</sup> 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. Standard of care is determined by the courts.

The guidelines provide the following information and guidance:

- 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

Professional 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.

## **2.2.2 WHY ARE PROFESSIONAL PRACTICE GUIDELINES CREATED**

Professional practice guidelines may be initiated and created for a variety of reasons:

- A request or recommendation from a group of members, an Engineers and Geoscientists BC committee, division or task force, or government
- Issues brought to Engineers and Geoscientists BC'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

## **2.2.3 HOW ARE PROFESSIONAL PRACTICE GUIDELINES STRUCTURED**

Typically, professional practice guidelines include the following sections:

- Defined Terms
- Introduction
- Roles and Responsibilities
- Guidelines for Professional Practice
- Quality Management in Professional Practice
- Professional Registration and Education, Training, and Experience

## **2.2.4 WHEN SHOULD PROFESSIONAL PRACTICE GUIDELINES BE USED**

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

## **2.2.5 WHY ARE PROFESSIONAL PRACTICE GUIDELINES IMPORTANT TO ENGINEERING/GEOSCIENCE PROFESSIONALS**

Professional practice guidelines have been created to help Engineering/Geoscience 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.

Engineering/Geoscience Professionals should be familiar with all guidelines that relate to their work. Failure to comply with the intent of a professional practice guideline may be considered evidence of unprofessional conduct and may result in disciplinary proceedings by Engineers and Geoscientists BC.

## **2.2.6 WHAT ARE PROFESSIONAL PRACTICE GUIDELINES NOT INTENDED TO DO**

Professional practice guidelines are not intended to replace professional judgment. They tell the Engineering/Geoscience Professional what to do, not how to do it.

## **2.3 RESOURCES**

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A list of current Engineers and Geoscientists BC professional practice guidelines is located on the Engineers and Geoscientists BC website ([www.egbc.ca/guidelines](http://www.egbc.ca/guidelines)).

The same list includes professional practice guidelines that are available in other jurisdictions. To review current guidelines in another jurisdiction, visit the website of the relevant professional association.

## **2.4 OQM CERTIFICATION REQUIREMENTS**

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### **2.4.1 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 Engineering/Geoscience Professionals to comply with Engineers and Geoscientists BC professional practice guidelines related to engineering and geoscience work they undertake.

## 2.4.2 WHAT WILL THE OQM AUDITOR LOOK FOR

The OQM auditor will confirm that the Organization meets this requirement in the following ways:

- 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 Engineering/Geoscience Professionals are in fact using, and meeting the intent of, Engineers and Geoscientists BC professional practice guidelines related to their engineering and geoscience work

# 3.0 RETAINING PROJECT DOCUMENTATION

## 3.1 PURPOSE

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Engineering/Geoscience 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 Engineering/Geoscience Professionals in all sectors (listed in **Section 1: Introduction to the OQM Program and OQM Manual**).

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 Engineering/Geoscience Professionals are employed by Organizations, which ultimately own the project documentation. Engineering/Geoscience 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 Bylaw and the Engineers and Geoscientists BC *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 Engineering/Geoscience Professionals they employ so that the Engineering/Geoscience Professionals are better able to comply with the Bylaw and the QM guidelines on the 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.

## 3.2 GUIDANCE

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### 3.2.1 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 Engineering/Geoscience Professionals have met their professional and contractual obligations, or has been prepared and delivered for the project or work, regardless of the media used to create or store the documentation.

### 3.2.2 WHY RETAIN COMPLETE DOCUMENTATION OF ENGINEERING AND GEOSCIENCE WORK

Retaining complete and readily retrievable documentation is critical to professional practice and helps Engineering/Geoscience Professionals demonstrate that they are holding public safety paramount and serving the public interest as required in the *Act* and Code of Ethics.

Documentation serves the following purposes:

- 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 Engineering/Geoscience 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.

### 3.2.3 WHAT CONSTITUTES AN APPROPRIATE DOCUMENT RETENTION SYSTEM

**Table 3-1: Checklist of Considerations for Document and Records Management** at the end of this section presents considerations for developing a document or records management system.

### 3.2.4 WHAT DOCUMENTATION MUST BE RETAINED AS A RECORD BY ENGINEERING/GEOSCIENCE PROFESSIONALS

Retain documentation that is evidence of engineering or geoscience-related activities, events or transactions, or is evidence that Engineering/Geoscience Professionals have met their professional and contractual obligations. The nature of the work undertaken by an Engineering/Geoscience Professional will determine what constitutes complete documentation.

Depending on the sector, the list may include the following:

- 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 email
- Drawings, specifications, reports, and other professional documentation (hard copy or digital) sealed by an Engineering/Geoscience 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

### **3.2.5 WHEN SHOULD DOCUMENTATION BE RETAINED**

Retain any documentation that is evidence of engineering or geoscience-related activities, events or transactions, or is evidence that Engineering/Geoscience 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.

### **3.2.6 HOW LONG MUST DOCUMENTATION BE RETAINED AS A RECORD**

Engineers and Geoscientists BC 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.

### 3.2.7 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.

#### 3.2.7.1 Policy

A policy should include the following information:

- 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

#### 3.2.7.2 Procedures

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

#### 3.2.7.3 Systems

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

#### 3.2.7.4 Training

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

### 3.2.8 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** – being able to demonstrate, through security and access control, the origin of the documentation and the identity of those who created and revised it
- **Integrity** – being able to show that controls are in place to prevent the material content and meaning from being changed after the documentation was created

- **Accuracy** – being able to show that the documentation is correct and factual
- **Completeness** – being able to show that all parts of the original documentation are intact
- **Trustworthiness** – being 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 emails) should have references that 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.

### 3.3 RESOURCES

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

### 3.4 OQM CERTIFICATION REQUIREMENTS

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#### 3.4.1 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 ten (10) years after a project is completed or ten (10) years after documentation from ongoing work is no longer in use.

#### 3.4.2 WHAT WILL THE OQM AUDITOR LOOK FOR

The OQM auditor will confirm that the Organization meets this requirement in the following ways:

- 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 ten (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 that describes 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 ten (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 check-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, and correctness)
- Controls are in place for documents received by the Organization

TABLE 3-1: Checklist of Considerations for Documents and Records Management

CONSIDERATIONS		✓
<b>PREPARING DOCUMENTS</b>		
1.	Developing document standards for consistent, professional appearance that clearly identifies the Organization 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 email 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	
<b>FILING DOCUMENTS</b>		
10.	Creating and implementing a standard, Organization-wide 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 email 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	

TABLE 3-1: Checklist of Considerations for Documents and Records Management

CONSIDERATIONS		✓
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	
<b>REVISING DOCUMENTS</b>		
21.	Including a revision record indicating revision number, what was revised and by whom, on documents where version control is required (e.g., drawings, reports)	
22.	Clearly identifying the revisions (see the Engineers and Geoscientists BC <i>Quality Management Guidelines – Use of Seal</i> )	
23.	Creating and implementing a standard checking process for all revisions	
24.	Training users in document revision procedures	
<b>ISSUING DOCUMENTS</b>		
25.	Including an issue record, indicating purpose for issuing and when issued, on documents where version control is required (e.g., drawings, reports)	
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, email, or other) as a record of what was sent to whom, when it was sent, and how it was sent	
28.	To create an audit trail, retaining a record of who receives which document revisions and when they receive them	
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	
<b>RECEIVING DOCUMENTS</b>		
31.	Recording when documents are received, how they are received, and by whom they are received	
32.	Setting up a standard distribution indicating expectation of those receiving the document (e.g., approve, action by, information only)	
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 scanning, naming, and filing 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	

TABLE 3-1: Checklist of Considerations for Documents and Records Management

CONSIDERATIONS		✓
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	
<b>ARCHIVING RECORDS</b>		
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 (e.g., server, tapes, CDs, DVDs, hard copy)	
45.	Deciding on storage location (e.g., onsite, external)	
46.	Migrating or transferring records to their storage medium and location	
47.	Training document managers in archiving procedures	
<b>STORING RECORDS</b>		
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 (e.g., protection from moisture, fire)	
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	
<b>DESTROYING RECORDS</b>		
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 it was destroyed, and by whom it was destroyed	



# 4.0 CHECKING ENGINEERING AND GEOSCIENCE WORK

## 4.1 PURPOSE

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Engineering/Geoscience 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.

These obligations apply to Engineering/Geoscience Professionals in all sectors (listed in **Section 1: Introduction to the OQM Program and OQM Manual**). Regardless of sector, Engineering/Geoscience 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 Engineering/Geoscience Professionals usually develop and implement checking processes. This section of the *OQM Manual* provides guidance to Organizations that want to implement policies and procedures consistent with Bylaw 14(b)(2) regarding documented checking using a written quality control process. It is intended to help Organizations support the Engineering/Geoscience Professionals they employ, so that the Engineering/Geoscience Professionals are better able to comply with the Bylaw and the QM guidelines on the documented checks of engineering and geoscience work.

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.

## 4.2 GUIDANCE

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### 4.2.1 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 Engineering/Geoscience Professional who prepared the work.

#### **4.2.2 WHY PERFORM CHECKS OF ENGINEERING AND GEOSCIENCE WORK**

The *Act* and Bylaws require that Engineering/Geoscience 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 care<sup>1</sup> expected when preparing similar work. Checks provide a second set of eyes or a second look by the Engineering/Geoscience Professional who prepared the work, to confirm that the work is ready to be issued to those who will rely on it or that it is suitable for its purpose.

#### **4.2.3 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 guidance document that indicates what should be checked, when it should be checked, by whom it should be checked, how it should be checked, and what supporting records are required.

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

- Complexity and risk associated with the work
- The Engineering/Geoscience Professional's experience in preparing the work
- The checker's experience in checking work of a similar nature
- The Organization's process for conducting checks
- The applicable regulatory or statutory requirements
- The Organization's contractual obligations
- Recommendations contained in related Engineers and Geoscientists BC professional practice guidelines
- Whether empirical or cursory analysis versus more rigorous analysis was used

#### **4.2.4 WHAT WORK SHOULD BE CHECKED**

The Engineering/Geoscience Professional who is taking professional responsibility for the engineering or geoscience documents that are prepared for delivery to others must check the documents before sealing and signing them. The checking is intended to confirm that the documents are complete, meet all input

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<sup>1</sup> 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. Standard of care is determined by the courts.

requirements, are suitable for their intended use, and are ready to be sealed, before the work is issued or put into use.

Following are examples of work that should be checked.

#### 4.2.4.1 Input Requirements

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

Examples include the following:

- Client or user objectives and requirements
- Design or implementation criteria
- Applicable codes, standards, and legislation
- Organizational requirements and standards
- Related Engineers and Geoscientists BC professional practice guidelines

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

#### 4.2.4.2 Input Data

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

- 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.

Examples of checking input data include the following:

- 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 Engineering/Geoscience Professional, or that has been certified by a recognized

authority. However, once input data is incorporated into the engineering or geoscience work, the Professional of Record is confirming its suitability for his or her engineering or geoscience work.

#### 4.2.4.3 Design Software, Spreadsheets, or Related Data

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.

#### 4.2.4.4 Engineering and Geoscience Work

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

Make corrections and additions as needed before proceeding.

#### 4.2.4.5 Structural Designs

Most structural designs require an independent review. Refer to **Section 5: Independent Review of Structural Designs** of this manual for information about these reviews.

#### 4.2.4.6 Concept Reviews or Independent Reviews

Concept reviews or independent reviews may be required in disciplines other than structural engineering.

Determine whether the complexity of the work, assessed risk to the public, applicable legislation, or applicable Engineers and Geoscientists BC professional practice guidelines indicate a need for carrying out more involved or independent reviews. Carry out concept reviews or independent reviews, as required.

### 4.2.5 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.

### 4.2.6 WHO IS RESPONSIBLE FOR ENSURING THAT APPROPRIATE CHECKS TAKE PLACE

Professionals of Record are responsible for ensuring that checks are performed on engineering or geoscience work that they prepare or directly supervise.

Engineering/Geoscience 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 Professional of Record remains professionally responsible for the engineering or geoscience work he or she has prepared and delivered or directly supervised.

#### **4.2.7 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 Engineering/Geoscience Professional may be the checker. In this context, a qualified person conducting the check must meet the following requirements:

- 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.

#### **4.2.8 WHEN IS THIRD PARTY OR INDEPENDENT REVIEW APPROPRIATE**

To determine the need for third-party or independent review, Engineering/Geoscience Professionals should consider:

- legislative requirements;
- the complexity of the work;
- elements of risk;
- availability, quality, and reliability of background information and field data;
- client requirements; and
- their own training and experience.

#### **4.2.9 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 Engineering/Geoscience 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 Engineering/Geoscience Professional considers the probability of occurrence or the magnitude of the potential result acceptable for self-checking
- Applicable Engineers and Geoscientists BC professional practice guidelines permit self-checking
- The work does not involve a structural design requiring an independent review
- The Engineering/Geoscience Professional has assessed that a self-check will meet the required standard of care<sup>1</sup> for the work he or she is carrying out

Even when an independent check is used, Engineering/Geoscience Professionals must self-check their work and not rely on others to find errors and omissions.

#### 4.2.10 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 it was checked, and by whom it was checked. 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.

### 4.3 RESOURCES

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A sample flowchart showing a generic checking process is shown in **Figure 4-1: Example Checking Process Using a Flowchart and Checklists** at the end of this section.

Considerations for developing documented checking procedures that meet the Bylaw are included in **Table 4-1: Checklist of Considerations for Documented Checking Procedures** at the end of this section.

### 4.4 OQM CERTIFICATION REQUIREMENTS

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#### 4.4.1 WHAT IS THE OVERALL REQUIREMENT FOR OQM CERTIFICATION

The overall requirement for OQM certification for this section of the *OQM Manual* is that the Organization is carrying out documented checks of engineering and geoscience work, using a documented process appropriate to the risk of work undertaken.

#### 4.4.2 WHAT WILL THE OQM AUDITOR LOOK FOR

The OQM auditor will confirm that the Organization meets this requirement in the following ways:

- 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 the check was completed, issues of substance identified, and any resulting correction or corrective action taken

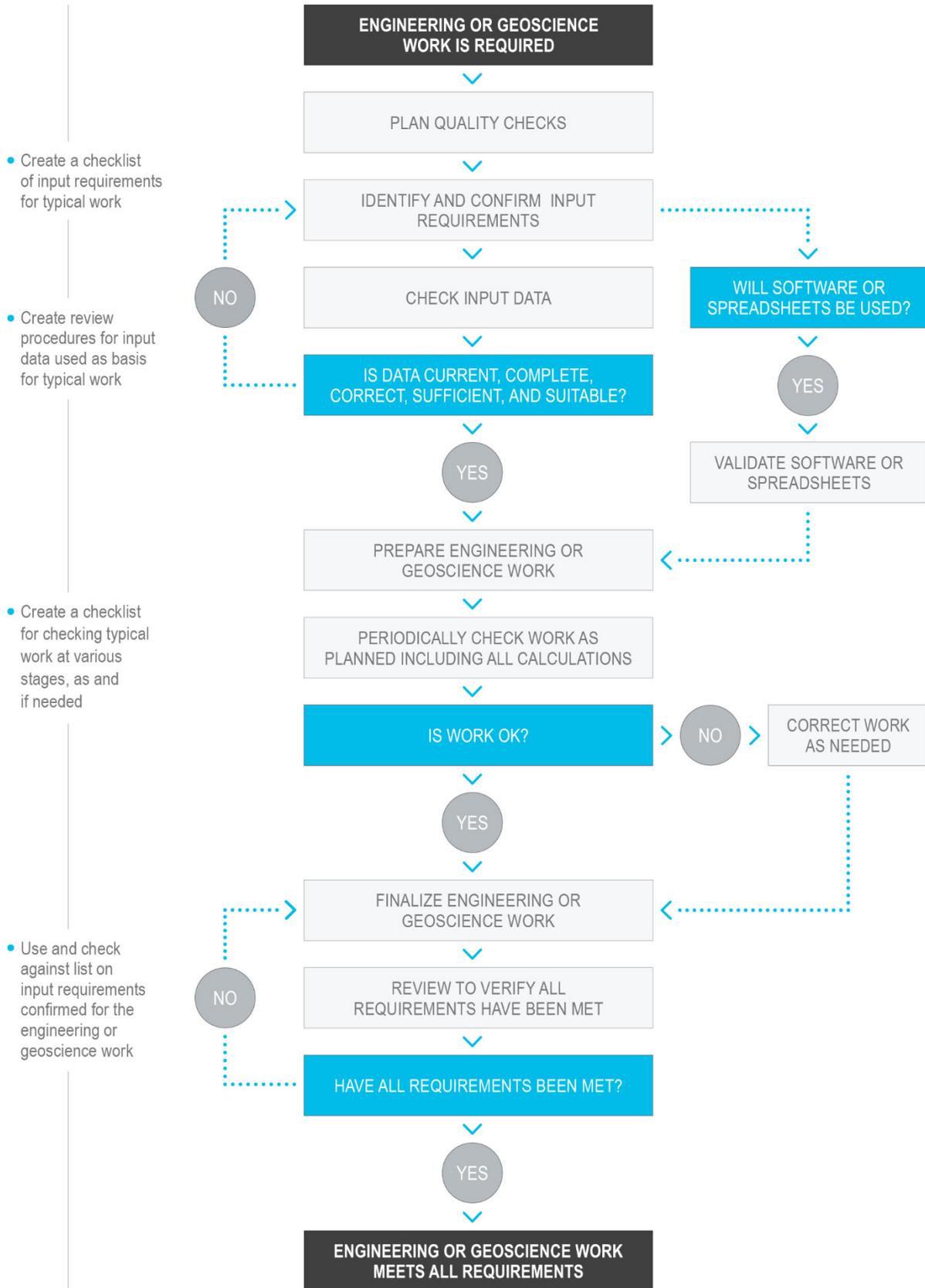


FIGURE 4-1: Example Checking Process Using a Flowchart and Checklists

TABLE 4-1: Checklist of Considerations for Documented Checking Procedures

CONSIDERATIONS		✓
<b>CAPABILITY TO PERFORM THE WORK</b>		
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	
<b>LEVEL OF CHECKING REQUIRED</b>		
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 the checks are to be performed, and by whom the checks are to be conducted	
<b>SELF-CHECKING AS THE ONLY CHECK</b>		
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 Engineering/Geoscience Professional 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 Engineers and Geoscientists BC professional 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	

TABLE 4-1: Checklist of Considerations for Documented Checking Procedures

CONSIDERATIONS		✓
<b>INPUT REQUIREMENTS</b>		
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 Engineers and Geoscientists BC professional 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	
<b>INPUT DATA</b>		
19.	Identifying input data such as test and survey data; design or implementation assumptions; applicable codes or 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	
<b>DESIGN SOFTWARE</b>		
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	
<b>ENGINEERING AND GEOSCIENCE WORK</b>		
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	

TABLE 4-1: Checklist of Considerations for Documented Checking Procedures

CONSIDERATIONS		✓
<b>QUALIFICATIONS OF CHECKERS</b>		
29.	Having checking undertaken by an engineer, geoscientist, licensee, EIT, GIT or other appropriately qualified party who meets the following requirements: <ul style="list-style-type: none"> <li>• Has current expertise in the discipline and type of work being checked</li> <li>• Is sufficiently experienced to identify the elements to be checked</li> <li>• Understands the checking process</li> <li>• Has reviewed and understood all relevant requirements</li> <li>• Is objective</li> <li>• Is thorough and diligent in checking and recording observations</li> </ul>	
<b>CHECKING TOOLS</b>		
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.	Providing training on checking tools and procedures	
<b>RECORDS AND FOLLOW-UP</b>		
33.	Keeping a record of checks	
34.	Identifying project or work, Professional of Record, 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

## 5.1 PURPOSE

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Engineering 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.

These independent reviews must be performed by an experienced professional engineer or licensee, including limited licensee, licensed to practice structural engineering by Engineers and Geoscientists BC, who has not been involved in preparing the design. These obligations apply to Engineering Professionals in all sectors (listed in **Section 1: Introduction to the OQM Program and OQM Manual**). Regardless of the sector, Engineering 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 Engineering Professionals. This section of the *OQM Manual* provides guidance to Organizations wishing to implement policies and procedures 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 Engineering Professionals they employ, so that the Engineering Professionals are better able to comply with the Bylaw and the Engineers and Geoscientists BC QM guidelines on 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 specific means and methods used to meet this Quality Management Requirement are the prerogative of the Organization.

## 5.2 GUIDANCE

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### 5.2.1 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 Engineers and Geoscientists BC, 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: Checking Engineering and Geoscience Work** of this manual and to the Engineers and Geoscientists BC *Quality Management Guidelines – Documented Checks of Engineering and Geoscience Work*.

## 5.2.2 WHY PERFORM AN INDEPENDENT REVIEW OF STRUCTURAL DESIGNS

The *Act* and Bylaws require that Engineering Professionals have documented independent reviews of their structural designs carried out before issuing structural design documents for construction. Independent reviews are the Engineering 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 care<sup>1</sup> expected when preparing similar work.

Independent reviews have been mandated by Engineers and Geoscientists BC 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.

## 5.2.3 WHAT CONSTITUTES AN APPROPRIATE INDEPENDENT REVIEW PROCESS

Refer to the generic procedure for independent reviews provided in **Section 4.3: Resources** in this manual.

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

- 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

## 5.2.4 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 *BC Building Code*, the *Vancouver Building Bylaw*, or the *National Building Code* (see **Section 5.2.5: When Is Independent Review Not Required**), 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.

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<sup>1</sup> 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. Standard of care is determined by the courts.

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.

### **5.2.5 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 *BC 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 *BC 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 *BC Building Code*, the *Vancouver Building Bylaw*, or the *National Building Code* is required, an independent review is also required.

### **5.2.6 WHO IS RESPONSIBLE FOR ENSURING THAT INDEPENDENT REVIEWS TAKE PLACE**

The Engineering 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 Engineering 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 Engineering 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 Engineering Professionals retained by the component manufacturer and incorporated into the primary structural system. However, the Engineering 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.

### 5.2.7 WHO IS QUALIFIED TO PERFORM INDEPENDENT REVIEWS OF STRUCTURAL DESIGNS

To be qualified, a reviewer must be an Engineering Professional who is licensed to practice structural engineering by Engineers and Geoscientists BC. In addition, the reviewer:

- 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 six years of experience with the particular structural system being reviewed; and
- must not have been involved in preparing the design.

### 5.2.8 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: Checking Engineering and Geoscience Work** of this manual.

### 5.2.9 HOW ARE INDEPENDENT REVIEWS DOCUMENTED

The independent reviewer must communicate the results of the review to the Engineering 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.

See **Section 5.3: Resources** and the Checklist and Signoff for Independent Review at the end of this section, for an example of an appropriate record.

## 5.3 RESOURCES

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### 5.3.1 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.

### 5.3.2 ROLE OF THE ENGINEERING PROFESSIONAL OF RECORD

The Engineering 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 Engineering 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 (e.g., seismic parameters, soil bearing capacity, lateral soil pressure, pile capacity);
  - 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; and
  - any special loading conditions or performance criteria.
- Structural design notes and calculations, when requested by the reviewer.

### 5.3.3 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 Engineering Professional of Record. It is the responsibility of the Engineering Professional of Record to adequately resolve concerns noted in the independent review.
- Provide a formal record of the independent review to the Engineering Professional of Record, highlighting any concerns (see the **Checklist and Signoff for Independent Review** included at the end of this section).
- If significant concerns are noted, request that the design be revised and resubmitted.

### 5.3.4 GENERIC FORM

A generic **Checklist and Signoff for Independent Review** is included at the end of this section.

## 5.4 OQM CERTIFICATION REQUIREMENTS

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### 5.4.1 WHAT IS THE OVERALL REQUIREMENT FOR OQM CERTIFICATION

The overall requirement for OQM certification for this section of the *OQM Manual* is that Engineering 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 QM Guideline.

### 5.4.2 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 meets this requirement in the following ways:

- The Organization has a documented process in place to conduct independent review of structural designs.
- Processes 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.
- Engineering Professionals who are 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 Engineering Professional of Record to the independent reviewer is as required by the *Quality Management Guidelines – 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; and
  - 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 the Engineering Professional of Record.
  - Independent reviewers are providing a formal record of the independent reviews to the Engineering Professional of Record, highlighting any concerns.
  - Where independent reviewers note significant concerns, they are requesting that the Engineering Professional of Record revise and resubmit the design documents for independent review.
  - Engineering 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 AN INDEPENDENT REVIEW

*[Print clearly and legibly]*

### PROFESSIONAL OF RECORD

**RE:** \_\_\_\_\_  
 Name of project or work

\_\_\_\_\_  
 Address of project or work

\_\_\_\_\_  
 Legal description of project or work

\_\_\_\_\_  
 P.Eng. or Licensee name

\_\_\_\_\_  
 Firm name

\_\_\_\_\_  
 Address

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 (e.g., wind, seismic)		
5. Drawing completeness and continuity of load paths		
6. Design check of representative structural elements		
7. Review of representative structural details		
8. Concerns discussed with the Professional of Record		

### INDEPENDENT REVIEWER

\_\_\_\_\_  
 P.Eng. or Licensee name

\_\_\_\_\_  
 Firm name

\_\_\_\_\_  
 Address

\_\_\_\_\_  
 Signature

\_\_\_\_\_  
 Date: (yy/mm/dd)

# CHECKLIST AND SIGNOFF FOR AN INDEPENDENT REVIEW

[Print clearly and legibly]

TO: **PROFESSIONAL OF RECORD**

DATE: \_\_\_\_\_

\_\_\_\_\_  
P.Eng. or Licensee name

\_\_\_\_\_  
Firm name

\_\_\_\_\_  
Address

RE: Project name

\_\_\_\_\_  
Address of project

\_\_\_\_\_  
Legal description of project

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 Professional of Record for the structural components, has been completed by this Independent Reviewer.

I certify that I am an Engineering Professional as defined below.

DATE: \_\_\_\_\_

\_\_\_\_\_  
Name

\_\_\_\_\_  
Signed

\_\_\_\_\_  
Address

\_\_\_\_\_  
Telephone

(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. (Name of firm)

**NOTE:**

1. The above letter must be signed by an Engineering Professional (professional engineers, licensees, including limited licensees, licensed to practice by Engineers and Geoscientists BC) qualified to conduct an Independent Review on the structural design being reviewed.
2. This letter is endorsed by Engineers and Geoscientists BC.

# 6.0 USE OF SEAL

## 6.1 PURPOSE

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Engineering/Geoscience Professionals are required to seal all professional engineering or professional geoscience documents that they prepare or that were prepared under their direct supervision, and that will be delivered to others who will rely on the information contained in the documents.

These obligations apply to Engineering/Geoscience Professionals in all sectors (listed in **Section 1: Introduction to the OQM Program and OQM Manual**). Failure to seal engineering or geoscience documents that they prepare and deliver in their professional capacity or that were 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 Engineering/Geoscience Professionals. This section of the *OQM Manual* provides guidance to Organizations that want to implement policies and procedures that are consistent with the *Act* regarding the use of Engineers and Geoscientists BC seals.

It is intended to help Organizations support the Engineering/Geoscience Professionals they employ, so that the Engineering/Geoscience Professionals are better able to comply with the *Act* and the QM guidelines on use of seal.

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.

## 6.2 GUIDANCE

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### 6.2.1 WHAT IS MEANT BY SEALING A DOCUMENT

The purpose of the Engineers and Geoscientists BC seal is to authenticate engineering and geoscience documents. When signed and dated, an Engineering/Geoscience 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 Engineering/Geoscience 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 Engineering/Geoscience 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 Engineering/Geoscience 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 Engineering/Geoscience Professional whose name is on the seal.

## **6.2.2 WHY SEAL PROFESSIONAL DOCUMENTS**

Engineering/Geoscience Professionals are required by the *Act* to seal all documents that they prepare and deliver in their professional capacity or that were prepared and delivered under their direct supervision.

In applying their seal on a document, Engineering/Geoscience 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.

## **6.2.3 WHAT CONSTITUTES AN APPROPRIATE SYSTEM TO MANAGE THE USE OF SEALS**

Refer to the considerations and resources provided under **Section 6.3: Resources** in this manual.

## **6.2.4 WHICH DOCUMENTS SHOULD BE SEALED**

When Engineering/Geoscience Professionals act in their professional capacity to prepare and deliver a document that 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 seal. Engineering/Geoscience 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, emails, 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 the *Occupational Health and Safety Regulation*, the *BC Building Code*, and the *Safety Authority Act*, requires Engineering/Geoscience Professionals to seal engineering and geoscience documents relevant to the professional activity they are carrying out. Engineering/Geoscience 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, but they have been designed and fabricated outside of BC, an Engineering/Geoscience Professional is not required to seal fabrication or vendor documents for these items, provided they have been certified by the fabricator as meeting the performance specification prepared and sealed by that Engineering/Geoscience Professional.

However, Engineering/Geoscience Professionals are responsible for checking and sealing documents showing that the equipment meets the requirements of the BC *Occupational Health and Safety Regulation* and of Technical Safety BC (formerly the BC Safety Authority). Engineering/Geoscience Professionals are also responsible for preparing and sealing any documents for onsite 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 Engineering/Geoscience Professional. In addition, other legislation in BC may require the seal of an Engineering/Geoscience Professional on specific manufactured or fabricated products for use or installation in BC that have been designed and constructed/fabricated outside of BC.

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

Engineering/Geoscience 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 or not to seal a document, refer to **Table 6-4: When to Apply Seals** at the end of this section.

### **6.2.5 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 Engineering/Geoscience Professional must seal the document.
- If it is for information only, discussion purposes, or collaboration, or it is not in its final form, and the receiver will understand that they cannot rely on it to price, construct, install, implement, or use, the Engineering/Geoscience Professional does not need to seal the document(s).

A seal may only be applied when the Engineering/Geoscience Professional is ready to accept professional responsibility for the document and its engineering or geoscience contents. It must be applied before any engineering or geoscience document is delivered to others who will rely on that document.

Typically, an Engineering/Geoscience Professional prepares the document or has it prepared by others, reviews the document, and takes professional responsibility for the document's contents, before deciding to seal it and deliver it to those who will use or rely on it.

Engineering/Geoscience 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 Engineering/Geoscience Professional responsible for that document and its contents.

### **6.2.6 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 does not need to be originally sealed. The record copy of the document as issued on file will include the original seal.

If an electronic copy containing the Engineering/Geoscience Professional's seal is to be transmitted, controls should be in place to prevent alteration of the document after the seal is applied and to prevent misuse of the applied seal.

### **6.2.7 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 Professional of Record or they may be supplied by others such as the contractor, operations manager, or others who are responsible for the construction or implementation, and who are not under the Engineering/Geoscience 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. Engineering/Geoscience Professionals are not permitted to take responsibility for field measurements that were not carried out under their direct supervision.

Engineering/Geoscience Professionals may only seal documents that also contain as-constructed or as-implemented information provided by others who are 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 Engineers and Geoscientists BC *Quality Management Guidelines – Use of Seal*.

### **6.2.8 WHAT TO CONSIDER WHEN SENDING PROFESSIONAL INFORMATION BY EMAIL**

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

### 6.2.9 OPTIONS FOR PROVIDING CADD FILES TO A CLIENT

Clients, owners, or authorities having jurisdiction may request editable CADD files to use for maintaining 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 that may be made by the receivers of such files, Engineering/Geoscience Professionals may use the following methods:

- Embed the CADD file(s) in a portable document format (PDF) file and seal the PDF file using an electronic seal and digital certification technology that meets the Engineers and Geoscientists BC best practices for digital certification of electronically applied seals
- Seal a hard-copy version of the drawings and provide the hard copy together with a set of editable CADD files that are not sealed
- Scan a sealed set of drawings and provide the sealed set together with a set of editable CADD files that are not sealed

### 6.2.10 WHAT TO CONSIDER WHEN PROFESSIONAL DOCUMENTS MUST BE TRANSLATED

Engineering/Geoscience Professionals may not seal documents in languages other than their working language(s).

Non-Engineering/Geoscience Professionals may not translate engineering and geoscience documents as this is the practice of professional engineering or professional geoscience.

Furthermore, Engineering/Geoscience Professionals may not seal documents translated by a non-Engineering/Geoscience Professional.

### 6.2.11 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 **Table 6-1: Where to Apply Seals**.

Sign and date the seal. The seal is not complete without the Engineering/Geoscience Professional's signature and the date the seal is being applied. No one else may sign an Engineering/Geoscience 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 touching 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 Engineers and Geoscientists BC and use an Engineers and Geoscientists BC-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 Engineers and Geoscientists BC that the provider meets Engineers and Geoscientists BC best practices (see Table 6-2: Engineers and Geoscientists BC Best Practices for Digital Certification Technology).
3. Purchase an electronic version of the seal from Engineers and Geoscientists BC and choose a digital certificate service provider that has not been independently confirmed to meet the Engineers and Geoscientists BC best practices.

However, if an Engineering/Geoscience Professional chooses the third option, Engineers and Geoscientists BC 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 equivalent to a hard copy document sealed with the Engineering/Geoscience Professional's wet ink stamp with handwritten signature and date.

Engineers and Geoscientists BC 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.

#### **6.2.12 LEGAL REQUIREMENTS FOR ELECTRONIC SEALS**

Engineering/Geoscience Professionals:

- must use an electronic seal issued by Engineers and Geoscientists BC; or
- alternatively, they may have an electronic replica of their seal created, but must use it with a digital certificate technology provided by Notarius, Inc. or another service provider that has been independently confirmed to meet Engineers and Geoscientists BC best practices (refer to **Table 6-2: Engineers and Geoscientists BC Best Practices for Digital Certification Technology**).

The seal must bear the engineer, geoscientists, or licensee's name, as well as the words "Professional Engineer, Province of British Columbia," "Professional Geoscientist, Province of British Columbia," or "Limited Licensee," respectively. When applied with a digital certificate, it must include the date that the Engineering/Geoscience Professional sealed the document.

The electronic seal must be able to be "returned" to Engineers and Geoscientists BC; that is, an Engineering/Geoscience Professional must be able to show Engineers and Geoscientists BC that he or she is no longer able to use the electronic seal.

#### **6.2.13 WHAT RECORDS MUST BE RETAINED**

Engineering/Geoscience Professionals or their Organizations are required to retain copies of all sealed documents issued to others.

## 6.3 RESOURCES

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### 6.3.1 MANAGING THE USE OF SEALS WITHIN AN ORGANIZATION

Organizations should put in place a system to control the use and prevent the misuse of Engineers and Geoscientists BC seals within the Organization that reflects the following considerations:

- Be aware that:
  - Engineers and Geoscientists BC owns the Engineering/Geoscience Professional's seal and can require it to be returned to Engineers and Geoscientists BC in cases where serious issues of misuse have been identified;
  - the seal must remain in the care and control of the Engineering/Geoscience Professional to whom it was issued; and
  - no one else can sign the seal on behalf of the Engineering/Geoscience Professional.
- Understand when Engineering/Geoscience Professionals must seal documents that they prepare and deliver.
- Understand that the Engineering/Geoscience 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 Engineering/Geoscience 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 Engineers and Geoscientists BC best practices, such as that provided by Notarius, Inc. (see **Table 6-2: Engineers and Geoscientists BC Best Practices for Digital Certification Technology**).

Use the following resources, located at the end of this section, to assist Engineering/Geoscience Professionals in appropriately applying their seals:

- **Table 6-1: Where to Apply Seals**
- **Table 6-2: Engineers and Geoscientists BC Best Practices for Digital Certification Technology**
- **Table 6-3: Practical Methods for Issuing Sealed Documents**
- **Table 6-4: When to Apply Seals**

## 6.4 OQM CERTIFICATION REQUIREMENTS

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### 6.4.1 WHAT IS THE OVERALL REQUIREMENT FOR OQM CERTIFICATION

Engineering/Geoscience Professionals employed by the Organization are sealing all engineering or geoscience documents they prepare or that were prepared under their direct supervision, before the documents are delivered to others who will rely on the information contained in the documents.

### 6.4.2 WHAT WILL THE OQM AUDITOR LOOK FOR

The OQM auditor will confirm that the Organization meets this requirement in the following ways:

- 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 Engineering/Geoscience Professionals acting in their professional capacity or directly supervising the work contained in the documents
- Documents are being sealed by the Engineering/Geoscience Professional with the lowest level of direct professional responsibility for the work (see definition of 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 Professional of Record
- Before sealing a document, the Professional of Record is reviewing the document and accepting professional responsibility for its content
- The type of seal used in the 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 Engineers and Geoscientists BC, or an electronic replica of their seal has been created and is used with a digital certificate technology provided by Notarius, Inc. or another service provider where there is independent confirmation that the Engineers and Geoscientists BC best practices have been met (see **Table 6-2: Engineers and Geoscientists BC Best Practices for Digital Certification Technology**)
- Where digital certificates are being used, the service provider has been independently confirmed to meet the Engineers and Geoscientists BC best practices, or is sanctioned by Engineers and Geoscientists BC
- 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 emails are followed up with sealed documents
- Engineering/Geoscience Professionals are sealing only documents prepared in languages in which they are fluent
- Sealed documents (whether hard copy and digital) are retained as records

TABLE 6-1: *Where to Apply Seals*

TYPE OF DOCUMENT	LOCATION
<b>DRAWINGS</b>	<ul style="list-style-type: none"> <li>• In an allotted space in the title block or in the lower right-hand corner of each drawing</li> </ul>
<b>SPECIFICATIONS</b>	<ul style="list-style-type: none"> <li>• On the first page or cover sheet of the section to which the seal applies or, if responsible for the overall specification, on the cover sheet for the overall specification</li> </ul>
<b>REPORTS</b>	<ul style="list-style-type: none"> <li>• Next to the title of the author or signature in the report, whether at the beginning or end of the report</li> </ul>
<b>OTHER PROFESSIONAL DOCUMENTS</b>	<ul style="list-style-type: none"> <li>• Next to the title of the author or signature, whether at the beginning or end of the document</li> </ul>
<b>DIGITAL FILES</b>	<ul style="list-style-type: none"> <li>• Use an electronic seal only in combination with digital certification technology, in a location appropriate to the type of document</li> </ul>

TABLE 6-2: Best Practices for Digital Certification Technology

BEST PRACTICES FOR DIGITAL CERTIFICATION TECHNOLOGY
For Engineers and Geoscientists BC 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 that has been independently verified as meeting the following best practices <sup>a</sup> :
<ul style="list-style-type: none"> <li>• Provide a seal that bears the engineer, geoscientists, or licensee’s name and the words “Professional Engineer, Province of British Columbia,” “Professional Geoscientist, Province of British Columbia,” or “Limited Licensee,” respectively.</li> </ul>
<ul style="list-style-type: none"> <li>• Be experienced in providing this technology to members and licensees of other professional associations.</li> </ul>
<ul style="list-style-type: none"> <li>• Have the resources, technical support, and systems in place to provide continuity of service for years to come.</li> </ul>
<ul style="list-style-type: none"> <li>• Have protocols consistent with Engineers and Geoscientists BC’s authority to regulate the use of the Engineering/Geoscience Professional’s seal, by allowing Engineers and Geoscientists BC to revoke or suspend the Engineering/Geoscience Professional’s ability to use their seal.</li> </ul>
<ul style="list-style-type: none"> <li>• Have protocols consistent with Engineers and Geoscientists BC’s need to ensure that only an Engineering/Geoscience Professional is granted the authority to own and use an electronically applied seal with his or her personalized digital certificate.</li> </ul>
<ul style="list-style-type: none"> <li>• Have a platform that offers flexibility and ease of use for a wide range of purposes and applications (e.g., that is compatible with different file formats, ability to seal, sign, and date multiple sets of engineering/geoscience documents in a single operation).</li> </ul>
<ul style="list-style-type: none"> <li>• Have digital certification technology that is compatible with that used by members of the Architectural Institute of BC.</li> </ul>
<ul style="list-style-type: none"> <li>• Use a public key infrastructure (PKI), which is a combination of hardware, software, people, policies, and procedures needed to create, manage, distribute, use, store, and revoke digital signatures.</li> </ul>
<ul style="list-style-type: none"> <li>• Have a digital certificate that is compliant with the International Telecommunications Union X509v3 standard.</li> </ul>
<ul style="list-style-type: none"> <li>• Maintain the digital certificate under the sole control and possession of the Engineering/Geoscience Professional.</li> </ul>
<ul style="list-style-type: none"> <li>• Allow the digital certificate to be stored on the media of the Engineering/Geoscience Professional’s choice (e.g., hard drive, memory stick).</li> </ul>
<ul style="list-style-type: none"> <li>• Provide interfaces between the technology and the software used by Engineering/Geoscience Professionals so the image of the Engineering/Geoscience Professional’s seal, with signature and date, appears when printing the document.</li> </ul>

Note:

<sup>a</sup> Engineers and Geoscientists BC will only endorse those digital certificate service providers that are confirmed by an independent consultant to have met the Engineers and Geoscientists BC best practices

TABLE 6-3: *Practical Methods for Issuing Sealed Documents*

PRACTICAL METHODS FOR ISSUING SEALED DOCUMENTS
<p>Following are practical ways Engineering/Geoscience Professionals can comply with the Quality Management Requirement and issue documents that require sealing:</p>
<p><b>HARD COPY DOCUMENTS</b></p>
<ul style="list-style-type: none"> <li>• 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 must be retained by the Engineering/Geoscience Professional. This method may be impractical for issuing a large number of sets.</li> </ul>
<ul style="list-style-type: none"> <li>• Print the document(s) to apply the seal to the original, sign and date the seal, reproduce multiple hard copies, as needed, and issue the copies of the document(s). The Engineering/Geoscience Professional does not need to originally seal the copies. A record sealed set must be retained by the Engineering/Geoscience Professional.</li> </ul>
<ul style="list-style-type: none"> <li>• Apply an electronic version of the seal to the document files, print the document(s), sign and date the seal on each original, reproduce multiple hard copies, as needed, and issue the copies of the document(s). Remove the electronic seal from working document files. The Engineering/Geoscience Professional does not need to originally seal the copies. A record sealed set must be retained by the Engineering/Geoscience Professional.</li> </ul>
<p><b>ELECTRONICALLY ISSUED DOCUMENTS</b></p>
<ul style="list-style-type: none"> <li>• Apply an electronic image of the seal to the file with digital certification that meets Engineers and Geoscientists BC best practices and transmit the file to others. A record sealed set must be retained by the Engineering/Geoscience Professional.</li> </ul>
<ul style="list-style-type: none"> <li>• Print the document(s), apply the seal to the original, sign and date the seal, scan the hard copy originally sealed document(s), and issue the file created electronically. A record sealed set must be retained by the Engineering/Geoscience Professional.</li> </ul>

TABLE 6-4: When to Apply Seals

STAGE OR TYPE OF DOCUMENT	INTERNALLY ISSUED CONCEPTUAL OR PRELIMINARY DOCUMENTS <sup>a</sup>  (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/geoscience office or department	EXTERNALLY ISSUED OR FORMALLY PREPARED AND DELIVERED INTERNAL DOCUMENTS			RETAIN DOCUMENT?
		Delivered to external users such as clients, contractors, government ministries, or authorities having jurisdiction			
		Delivered to internal users within the Organization such as other departments, branches, offices, or divisions for external or formal internal use <sup>b</sup>			
		SINGLE DISCIPLINE – SINGLE PROFESSIONAL OF RECORD	SINGLE DISCIPLINE – MULTIPLE PROFESSIONALS OF RECORD	MULTIPLE DISCIPLINES	
<b>PRELIMINARY OR DRAFT DOCUMENT</b>  A work in progress; non-finalized document <sup>c</sup>	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
<b>ESTIMATES</b>	No	No, unless the document contains engineering or geoscience content	No, unless the document contains engineering or geoscience content	No, unless the document contains engineering or geoscience content	Yes, if work awarded is based on the document
<b>BID, TENDER, PURCHASE, OR PROCUREMENT DOCUMENTS</b>  Documents prepared for any procurement process related to engineering and/or geoscience works, including any addenda incorporated in documents during bidding process	No, if the tender, purchase or procurement documents are being issued to bidders as information only and the 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

<sup>a</sup> For discussion or review purposes only as the validity of the contents are not intended or ready to be relied on by others.

Refer to Internal Documents and Preliminary Documents in Sections 3.2.2 and 3.2.3 of *Quality Management Guidelines – Use of Seal*.

<sup>b</sup> Refer to Internal Documents and Preliminary Documents in Sections 3.2.2 and 3.2.3 of *Quality Management Guidelines – Use of Seal*.

<sup>c</sup> Refer to Preliminary Documents in Section 3.2.3 of *Quality Management Guidelines – Use of Seal*.

TABLE 6-4: When to Apply Seals

STAGE OR TYPE OF DOCUMENT	INTERNALLY ISSUED CONCEPTUAL OR PRELIMINARY DOCUMENTS <sup>a</sup>  (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/geoscience office or department	EXTERNALLY ISSUED OR FORMALLY PREPARED AND DELIVERED INTERNAL DOCUMENTS			RETAIN DOCUMENT?
		Delivered to external users such as clients, contractors, government ministries, or authorities having jurisdiction			
		Delivered to internal users within the Organization such as other departments, branches, offices, or divisions for external or formal internal use <sup>b</sup>			
		SINGLE DISCIPLINE – SINGLE PROFESSIONAL OF RECORD	SINGLE DISCIPLINE – MULTIPLE PROFESSIONALS OF RECORD	MULTIPLE DISCIPLINES	
<b>STANDARD DRAWING<sup>d</sup></b>	No	Yes	Yes, each professional to seal and qualify area of responsibility	Yes, each professional to seal and qualify area of responsibility	Yes
<b>SPECIFICATIONS</b>	No	Yes	Yes, each professional to seal and qualify area of responsibility	Yes, each professional to seal and qualify area of responsibility	Yes
<b>ISSUED FOR PERMITTING</b> Documents prepared and deemed ready for permit purposes	No	Yes, seal as per originally issued document and mark accordingly  ISSUED FOR PERMIT PURPOSES ONLY	Yes, seal as per originally issued document and mark accordingly  ISSUED FOR PERMIT PURPOSES ONLY	Yes, seal as per originally issued document and mark accordingly  ISSUED FOR PERMIT PURPOSES ONLY	Yes
<b>DESIGN-BUILD</b>	No, if the documents are being used for internal purposes in preparation of the bid package	Yes, seal as per guidance in Section 3.2.12 <sup>e</sup>	Yes, seal as per guidance in Section 3.2.12 <sup>e</sup>	Yes, seal as per guidance in Section 3.2.12 <sup>e</sup>	Yes
<b>ISSUED FOR CONSTRUCTION, IMPLEMENTATION OF USE DOCUMENTS</b> Documents prepared and deemed ready for construction, implementation of use, including reissued bid documents where no changes were made during bidding	Not Applicable	Yes, seal as per originally issued document and mark accordingly  ISSUED FOR CONSTRUCTION, IMPLEMENTATION OR USE  If reissuing bid documents, see guidance in Section 3.4.5 <sup>e</sup>	Yes, seal as per originally issued document and mark accordingly  ISSUED FOR CONSTRUCTION, IMPLEMENTATION OR USE  If reissuing bid documents, see guidance in Section 3.4.5 <sup>e</sup>	Yes, seal as per originally issued document and mark accordingly  ISSUED FOR CONSTRUCTION, IMPLEMENTATION OR USE  If reissuing bid documents, see guidance in Section 3.4.5 <sup>e</sup>	Yes

<sup>d</sup> Refer to Standard Drawings in Section 3.2.9 of *Quality Management Guidelines – Use of Seal*. A professional who subsequently uses an unauthenticated standard document must determine that it is suitable for the current purpose and authenticate it accordingly.

<sup>e</sup> Refer to *Quality Management Guidelines – Use of Seal*

TABLE 6-4: When to Apply Seals

STAGE OR TYPE OF DOCUMENT	INTERNALLY ISSUED CONCEPTUAL OR PRELIMINARY DOCUMENTS <sup>a</sup>  (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/geoscience office or department	EXTERNALLY ISSUED OR FORMALLY PREPARED AND DELIVERED INTERNAL DOCUMENTS			RETAIN DOCUMENT?
		Delivered to external users such as clients, contractors, government ministries, or authorities having jurisdiction			
		Delivered to internal users within the Organization such as other departments, branches, offices, or divisions for external or formal internal use <sup>b</sup>			
		SINGLE DISCIPLINE – SINGLE PROFESSIONAL OF RECORD	SINGLE DISCIPLINE – MULTIPLE PROFESSIONALS OF RECORD	MULTIPLE DISCIPLINES	
<b>REVISED DOCUMENT<sup>f</sup></b> Document changed from a master document, or an earlier revised document, by a different Engineering/Geoscience Professional	No	Yes, clearly identify revisions; Engineering/ Geoscience Professional revising document must seal, sign, and date revisions with date revised	Yes, clearly identify revisions; Engineering/ Geoscience Professional revising document must seal, sign, and date revisions with date revised	Yes, clearly identify revisions; Engineering/ Geoscience Professional revising document must Seal, sign, and date revisions with date revised	Yes
<b>FINAL DESIGN DRAWINGS</b> Document that includes all design changes made by change order during construction, or by addenda during bidding, and not previously incorporated in documents	Not Applicable	Yes, seal as per originally issued document	Yes, seal as per originally issued document	Yes, seal as per originally issued document	Yes
<b>RECORD DRAWINGS<sup>g</sup></b> Document that includes as-constructed or as-implemented information	Not Applicable	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 (see Clause 3.2.15.9 <sup>e</sup> )	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 (see Clause 3.2.15.9 <sup>e</sup> )	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 (see Clause 3.2.15.9 <sup>e</sup> )	Yes

<sup>f</sup> Refer to Section 3.4.4 of *Quality Management Guidelines – Use of Seal* for further information regarding a different Professional of Record sealing revised documents.

<sup>g</sup> Refer to Section 3.2.15 in *Quality Management Guidelines – Use of Seal* for further information regarding sealing record drawings.

TABLE 6-4: When to Apply Seals

STAGE OR TYPE OF DOCUMENT	INTERNALLY ISSUED CONCEPTUAL OR PRELIMINARY DOCUMENTS <sup>a</sup>  (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/geoscience office or department	EXTERNALLY ISSUED OR FORMALLY PREPARED AND DELIVERED INTERNAL DOCUMENTS			RETAIN DOCUMENT?
		Delivered to external users such as clients, contractors, government ministries, or authorities having jurisdiction			
		Delivered to internal users within the Organization such as other departments, branches, offices, or divisions for external or formal internal use <sup>b</sup>			
		SINGLE DISCIPLINE – SINGLE PROFESSIONAL OF RECORD	SINGLE DISCIPLINE – MULTIPLE PROFESSIONALS OF RECORD	MULTIPLE DISCIPLINES	
<b>FIELD DOCUMENTS<sup>h</sup></b> Professional documents prepared and issued in the field that contain opinions or decisions that change the issued for construction documents	Not Applicable	Seal in the field or follow up by preparing in office, sealing as per originally issued document, and retaining in files  This QM guideline does not require that a sealed copy be sent to field recipient	Seal in the field or follow up by preparing in office, sealing as per originally issued document, and retaining in files  This QM guideline does not require that a sealed copy be sent to field recipient	Seal in the field or follow up by preparing in office, sealing as per originally issued document, and retaining in files  This QM guideline does not require that a sealed copy be sent to field recipient	Yes
<b>SHOP DRAWINGS</b> Documents prepared and designed by an Engineering/Geoscience Professional for a fabricator, supplier, equipment manufacturer, installer, or erector	No	Yes, seal as per originally issued document (see the association's <i>Professional Practice Guidelines: Shop Drawings</i> )	Yes, seal as per originally issued document (see the association's <i>Professional Practice Guidelines: Shop Drawings</i> )	Yes, seal as per originally issued document (see the association's <i>Professional Practice Guidelines: Shop Drawings</i> )	Yes
<b>REPORTS</b> Prepared by an Engineering/Geoscience Professional	No	Yes, next to the title of the author or signature in the report, whether at the beginning or end of the report	Yes, next to the title of the author or signature in the report, whether at the beginning or end of the report	Yes, next to the title of the author or signature in the report, whether at the beginning or end of the report	Yes
<b>DRAWINGS, MAPS, OR PLANS BOUND INTO ANOTHER BOUND DOCUMENT</b> 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

<sup>h</sup> Refer to Section 3.2.11 of *Quality Management Guidelines – Use of Seal* for further information regarding sealing field documents.

TABLE 6-4: When to Apply Seals

STAGE OR TYPE OF DOCUMENT	INTERNALLY ISSUED CONCEPTUAL OR PRELIMINARY DOCUMENTS <sup>a</sup>  (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/geoscience office or department	EXTERNALLY ISSUED OR FORMALLY PREPARED AND DELIVERED INTERNAL DOCUMENTS			RETAIN DOCUMENT?
		Delivered to external users such as clients, contractors, government ministries, or authorities having jurisdiction		Delivered to internal users within the Organization such as other departments, branches, offices, or divisions for external or formal internal use <sup>b</sup>	
		SINGLE DISCIPLINE – SINGLE PROFESSIONAL OF RECORD	SINGLE DISCIPLINE – MULTIPLE PROFESSIONALS OF RECORD	MULTIPLE DISCIPLINES	
<p><b>DOCUMENTS SUBMITTED IN RESPONSE TO DEMAND-SIDE LEGISLATION</b></p> <p>(e.g., the <i>Occupational Health and Safety Regulation, BC Building Code, or Safety Authority Act</i>)</p>	Not Applicable	Yes, seal as per originally issued document	Yes, seal as per originally issued document	Yes, seal as per originally issued document	Yes
<p><b>ELECTRONIC DOCUMENT</b></p> <p>Documents in digital format containing engineering or geoscience information</p>	No	Yes, seal as per originally issued document using electronic seal with digital certificate technology that meets Engineers and Geoscientists BC best practices, 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 Engineers and Geoscientists BC best practices, 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 Engineers and Geoscientists BC best practices, or print to hard copy, seal, sign, date, and retain in files	Yes
<p><b>DOCUMENTS FOR NON-BC WORK</b></p> <p>Engineering or geoscience projects geographically located outside of BC</p>	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 Engineering/Geoscience Professional	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 Engineering/Geoscience Professional	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 Engineering/Geoscience Professional	Yes

TABLE 6-4: When to Apply Seals

STAGE OR TYPE OF DOCUMENT	INTERNALLY ISSUED CONCEPTUAL OR PRELIMINARY DOCUMENTS <sup>a</sup>  (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/geoscience office or department	EXTERNALLY ISSUED OR FORMALLY PREPARED AND DELIVERED INTERNAL DOCUMENTS			RETAIN DOCUMENT?
		Delivered to external users such as clients, contractors, government ministries, or authorities having jurisdiction		Delivered to internal users within the Organization such as other departments, branches, offices, or divisions for external or formal internal use <sup>b</sup>	
		SINGLE DISCIPLINE – SINGLE PROFESSIONAL OF RECORD	SINGLE DISCIPLINE – MULTIPLE PROFESSIONALS OF RECORD	MULTIPLE DISCIPLINES	
<b>DOCUMENT PREPARED BY A NON-BC PROFESSIONAL</b>  Document prepared by an Engineering/ 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 both	Yes, if sealed
<b>DOCUMENT NOT PREPARED UNDER DIRECT SUPERVISION</b>  Document prepared by someone not under the direct supervision of the Engineering/Geoscience Professional	No	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 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 including altering or revising the document	Yes, if sealed
<b>TRANSLATED DOCUMENTS<sup>1</sup></b>  Document containing the same information in more than one language	No	Seal as per originally issued document  Seal translated documents only if fluent in language to which document translated	Seal as per originally issued document  Seal translated documents only if fluent in language to which document translated	Seal as per originally issued document  Seal translated documents only if fluent in language to which document translated	Yes, if sealed
<b>DOCUMENTS IN MULTIPLE LANGUAGES<sup>1</sup></b>	No	Seal in multiple languages only if fluent in those languages	Seal in multiple languages only if fluent in those languages	Seal in multiple languages only if fluent in those languages	Yes, if sealed

<sup>1</sup> Refer to Section 3.4.6 of *Quality Management Guidelines – Use of Seal* for further information about sealing translated documents

<sup>1</sup> Refer to Section 3.4.6 of *Quality Management Guidelines – Use of Seal* for further information about sealing documents in multiple languages.



# 7.0 DIRECT SUPERVISION

## 7.1 PURPOSE

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

These obligations apply to all Engineering/Geoscience Professionals in all sectors (listed in **Section 1: Introduction to the OQM Program and OQM Manual**). Regardless of the sector, Engineering/Geoscience 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 Engineering/Geoscience 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 Engineering/Geoscience Professionals they employ, so that when the Engineering/Geoscience Professionals are delegating engineering or geoscience work to subordinates, they are better able to comply with the *Act* and the Engineers and Geoscientists BC QM guidelines on direct supervision.

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.

## 7.2 GUIDANCE

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### 7.2.1 WHAT IS DIRECT SUPERVISION

Direct supervision, as defined in the *Act*, “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.

## **7.2.2 WHY IS ADEQUATE AND APPROPRIATE DIRECT SUPERVISION IMPORTANT**

When Engineering/Geoscience 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 Engineering/Geoscience Professionals retain appropriate control of that work.

## **7.2.3 WHAT CONSTITUTES APPROPRIATE DELEGATION OF ENGINEERING AND GEOSCIENCE WORK**

Refer to **Section 7.3: Resources** in this manual for the generic procedure for delegating engineering and geoscience resources.

## **7.2.4 WHEN CAN ENGINEERING AND GEOSCIENCE WORK BE DELEGATED**

Engineering/Geoscience 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 Engineering/Geoscience Professional has provided direct supervision that meets the intent of the requirement, the Engineering/Geoscience 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 Engineering/Geoscience 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 Engineering/Geoscience Professional may demonstrate active involvement through his or her knowledge of the project or work and its development or history; input on earlier drafts; review of particular elements throughout the project or work; or evidence of regular consultation.

## **7.2.5 WHEN CAN ENGINEERING OR GEOSCIENCE DOCUMENTS PREPARED BY OTHERS BE SEALED**

There are two circumstances in which Engineering/Geoscience 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 Engineering/Geoscience Professional, which is the topic of this section of the *OQM Manual*.

The second circumstance involves Engineering/Geoscience Professionals sealing documents prepared by others, where the Engineering/Geoscience Professional's prior involvement is minimal.

Detailed guidance on this topic is provided in the Engineers and Geoscientists BC *Quality Management Guidelines – Use of Seal*.

#### **7.2.6 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 Engineering/Geoscience 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 Engineering/Geoscience Professional may demonstrate direct supervision of a field review through specific instructions on what to observe, check, confirm, test, record, and report.

An Engineering/Geoscience Professional must be able to demonstrate that the subordinate contacted him or her when the circumstances required it. The Engineering/Geoscience Professional must always be involved in any engineering or geoscience decisions or judgments.

#### **7.2.7 WHO CAN MAKE ENGINEERING AND GEOSCIENCE DECISIONS**

Throughout the project or work, an Engineering/Geoscience Professional must have some degree of involvement in, and take responsibility for, all engineering or geoscience decisions.

This does not mean that the Engineering/Geoscience Professional must make every decision. Codes and standards of practice that the Engineering/Geoscience Professional has identified as relevant to the engineering and geoscience work involved can guide the subordinate's work.

The Engineering/Geoscience Professional must have understood the relevant issues, monitored the subordinate's work, given directions as needed, and reviewed each engineering or geoscience decision.

#### **7.2.8 WHAT IS APPROPRIATE DIRECT SUPERVISION**

The level of direct supervision may vary depending on the experience of the Engineering/Geoscience 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 Engineering/Geoscience 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.

## 7.2.9 HOW IS DIRECT SUPERVISION DOCUMENTED

Delegated work must be properly and adequately documented, and submitted to the Engineering/Geoscience Professional for review.

Records of delegated work and reviews must be retained to demonstrate that reviews of the subordinate's work by the Engineering/Geoscience Professional took place as planned.

## 7.3 RESOURCES

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### 7.3.1 GENERIC PROCEDURE FOR DELEGATING ENGINEERING AND GEOSCIENCE WORK

To delegate work to a subordinate, an Engineering/Geoscience Professional is required to:

- assess the work that may be delegated to confirm the knowledge, experience, and capabilities required, and any tools or resources (e.g., standards, codes) that can be used to successfully implement the work;
- 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;
- make required tools and resources available and address any gaps in them, including identifying subject matter experts to be consulted during the work;
- 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;
- establish the subordinate's scope of work, duties, responsibilities, authorities, and limits on acting alone;
- create a plan defining when and how the subordinate's work will be reviewed;
- delegate the work to the subordinate and communicate the scope of work, duties, responsibilities, authorities, limits on acting alone, and timing and process for required reviews;
- ensure that the delegated work is properly and adequately documented, and that it is submitted for review as planned; and
- retain documentation to demonstrate that professional reviews of the subordinate's work took place as planned.

See **Table 7-1: Checklist for the Organization to Confirm Appropriate Direct Supervision** in this manual for information on how to demonstrate whether Engineering/Geoscience Professionals in the Organization are meeting the direct supervision requirement.

## 7.4 OQM CERTIFICATION REQUIREMENTS

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### 7.4.1 WHAT IS THE OVERALL REQUIREMENT FOR OQM CERTIFICATION

Engineering/Geoscience Professionals are directly supervising any engineering or geoscience work they delegate.

### 7.4.2 WHAT WILL THE OQM AUDITOR LOOK FOR

The OQM auditor will confirm that the Organization meets this requirement in the following ways:

- 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.
- Engineering/Geoscience 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; and
  - being regularly consulted throughout the project or work.
- Engineering/Geoscience 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; and
  - being consulted throughout the project or work, and not just at final stage.
- Engineering/Geoscience 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; and
  - reviewing and following up on field reports.

- Engineering/Geoscience 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; and
  - reviewing each engineering and geoscience decision and the reasons for making it.
- Engineering/Geoscience 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; and
  - being available to answer subordinate’s questions and provide direction.

TABLE 7-1: Checklist for the Organization to Confirm Appropriate Direct Supervision

CHECKLIST FOR THE ORGANIZATION TO CONFIRM APPROPRIATE DIRECT SUPERVISION		
Can the Engineering/Geoscience 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 was 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 the complexity and critical nature of the 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	

TABLE 7-1: Checklist for the Organization to Confirm Appropriate Direct Supervision

CHECKLIST FOR THE ORGANIZATION TO CONFIRM APPROPRIATE DIRECT SUPERVISION		
<b>DEMONSTRATING INVOLVEMENT IN ALL ENGINEERING AND GEOSCIENCE DECISIONS</b>		
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	
<b>DEMONSTRATING SUPERVISION APPROPRIATE TO EXPERIENCE OF ENGINEERING/GEOSCIENCE PROFESSIONAL AND SUBORDINATE</b>		
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 the subordinate's questions and provide direction	

# 8.0 FIELD REVIEWS

## 8.1 PURPOSE

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Engineering/Geoscience 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 Engineering/Geoscience 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 Engineering/Geoscience Professionals in all sectors (listed in **Section 1: Introduction to the OQM Program and OQM Manual**). 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, a Professional of Record. Contractors bid on the work, and one is selected to construct or install it.
  - In this instance, the 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 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 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 Engineering/Geoscience 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 Engineering/Geoscience Professionals they employ, so that the Engineering/Geoscience Professionals are better able to comply with the Bylaw and the Engineers and Geoscientists BC *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 specific means and methods used to meet this Quality Management Requirement are the prerogative of the Organization.

## 8.2 GUIDANCE

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### 8.2.1 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 Engineering/Geoscience Professional or his or her subordinate acting under his or her direct supervision, that the Engineering/Geoscience 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 another party responsible for the implementation or construction) about nonconforming work observed in the field review. The field reviewer does not provide instructions about how to rectify or carry out the corrective work.

### 8.2.2 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 does not take 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 Engineering/Geoscience

Professionals may look the other way when they see a safety violation or concern. Engineering/Geoscience Professionals have a duty to hold public safety paramount.

When an Engineering/Geoscience 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 Engineering/Geoscience 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 Engineering/Geoscience Professional should make an immediate call to WorkSafeBC for assistance and indicate the urgency of the situation.

When acting in good faith, Engineering/Geoscience Professionals should be supported by the Organizations that employ them.

### **8.2.3 WHY ARE FIELD REVIEWS IMPORTANT**

Field reviews allow the Engineering/Geoscience 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 Engineering/Geoscience Professional with the opportunity to identify nonconforming work, and have it rectified or replaced, as appropriate. They also help Engineering/Geoscience Professionals keep their employer, the client, the owner, and other relevant professionals informed about the quality of the work.

### **8.2.4 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 Engineering/Geoscience Professionals. See **Section 8.3: Resources** in this manual for the generic procedure for documented field reviews.

### **8.2.5 HOW MANY FIELD REVIEWS ARE REQUIRED**

The number and extent of field reviews must always remain at the discretion of the Engineering/Geoscience Professional.

Consequently, it is contrary to the Engineering/Geoscience Professional's obligations to agree in advance to a fixed number or extent of field reviews. It is appropriate for the Engineering/Geoscience Professional to provide their employer, the 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, Engineering/Geoscience Professionals should assess the following:

- 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 Engineers and Geoscientists BC professional 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, prequalified 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

Engineering/Geoscience Professionals must act reasonably, but must not acquiesce to client or employer demands to conduct fewer field reviews than the Engineering/Geoscience Professional believes are necessary.

Engineering/Geoscience 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 Engineering/Geoscience Professional carries out.

Educating clients, owners, or employers, before field work begins, about the purpose of field reviews and the Engineering/Geoscience 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, Engineering/Geoscience Professionals are to follow these steps:

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*; and
  - not being able to seal assurance statements required by other legislation.

If, despite informing the client, owner, or employer of the consequences, permission or payment is not approved for an adequate number of field reviews as judged by the Engineering/Geoscience Professional, the Engineering/Geoscience Professional must consider how to fulfill her or his obligations under the Bylaw.

One possibility is that the Engineering/Geoscience 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.

### **8.2.6 WHEN SHOULD FIELD REVIEWS BE CONDUCTED**

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

Engineering/Geoscience Professionals who are 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 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 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 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 Professional of Record should prepare performance specifications that require the constructor/ fabricator to certify the equipment or products. The 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 Professional of Record is required to check the quality of what is received and confirm that it meets any requirements of the BC *Occupational Health and Safety Regulation* or Technical Safety BC (formerly the BC Safety Authority). The Professional of Record is also responsible for carrying out field reviews of any onsite services to the equipment.

### **8.2.7 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.

### **8.2.8 WHO CAN CONDUCT A FIELD REVIEW**

An Engineering/Geoscience Professional must carry out the field review or delegate it to a qualified individual working under the direct supervision of the Engineering/Geoscience Professional. This individual does not need to be a direct report, and in most instances is not. Engineers and Geoscientists BC recommends that the Professional of Record for preparing the engineering or geoscience documents for the work also be responsible for the field review.

The Engineering/Geoscience 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 Engineering/Geoscience 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 Engineering/Geoscience 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 Engineering/Geoscience Professional must be involved in any engineering or geoscience decisions made during, or as a result of, the field review.

As opportunity allows, the Engineering/Geoscience 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.

### **8.2.9 WHAT IF THE PROFESSIONAL OF RECORD IS NOT CARRYING OUT THE FIELD REVIEWS**

The Bylaw requires that an Engineering/Geoscience Professional or someone under his or her direct supervision carries out field reviews. Engineers and Geoscientists BC strongly recommends that the Professional of Record, who is professionally responsible for the preparation of the engineering or geoscience documents, also be responsible for field review.

Engineers and Geoscientists BC 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 Professional of Record for the required field reviews. In these circumstances, Engineering/Geoscience 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 Engineering/Geoscience Professional, responsible for field reviews would be the registered professional who signs the Letters of Assurance under the *BC Building Code*.

If the 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 Professional of Record must:

1. advise the client, owner or employer of the Engineering/Geoscience Professional's obligations under the *Act* and Bylaws 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; and
2. if the client, owner, or employer continues to refuse to authorize appropriate field review, the Engineering/Geoscience Professional is required to notify the appropriate regulatory body and consider removing him or herself from the project.

Although not within Engineers and Geoscientists BC's mandate, similar protocols are recommended for work requiring field review outside of Canadian jurisdictions.

#### **8.2.10 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 Engineering/Geoscience 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 Engineering/Geoscience 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.

### **8.2.11 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.

## **8.3 RESOURCES**

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### **8.3.1 GENERIC PROCEDURE FOR DOCUMENTED FIELD REVIEWS**

To carry out field reviews, an Engineering/Geoscience 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 name of photographer,
  - not enhancing, cropping, or otherwise editing photographs, except 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, and
  - 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 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; and
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 Engineering/Geoscience Professional, responsible for field reviews would be the registered professional who signs the Letters of Assurance under the *BC Building Code*.

If the 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 Professional of Record must advise the client, owner, or employer of the Engineering/Geoscience Professional's obligations under the *Act* and Bylaws and the consequences of not having appropriate field reviews carried out.

If the Professional of Record confirms that there is no intent to authorize appropriate field review, the Engineering/Geoscience Professional must notify the appropriate regulatory body and consider removing him or herself from the project.

## 8.4 OQM CERTIFICATION REQUIREMENTS

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### 8.4.1 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.

### 8.4.2 WHAT WILL THE OQM AUDITOR LOOK FOR

The OQM auditor will confirm that the Organization meets this requirement in the following ways:

- The Organization's Engineering/Geoscience Professionals are using a documented process to carry out field reviews
- Engineering/Geoscience Professionals are not predetermining the number of field reviews required
- Appropriate criteria including level of risk is being used by Engineering/Geoscience 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 Professional of Record or someone under his or her direct supervision
- Engineering/Geoscience Professionals have appropriate documented protocols in place for situations where the client, owner, or employer decides to use someone other than the Professional of Record 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, Engineering/Geoscience 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

- Engineering/Geoscience Professionals are advising their client, the owner, or the employer when more field reviews are required and why
- Engineering/Geoscience 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 is 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

## 9.1 WHAT DOES IT MEAN TO IMPLEMENT ORGANIZATIONAL QUALITY MANAGEMENT

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

- specific to the professional engineering and geoscience products and services they provide; and
- 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 Engineers and Geoscientists BC 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 (see **Table 9-1: OQM Audit Checklist**).
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 Engineers and Geoscientists BC *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*.

## 9.2 WHEN DO THE OQM PROGRAM AND OQM MANUAL APPLY

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Engineers and Geoscientists BC's OQM Program is applicable to all Organizations that employ Engineering/Geoscience Professionals and provide services or products requiring the application of professional engineering or professional geoscience, spanning all sectors including, but not limited to, the following sectors:

- Aerospace
- Construction
- Consulting
- Educational
- First Nations
- Government (all three 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 Engineering/Geoscience Professionals in all sectors where their work in their professional capacity may apply to or be used in the following activities:

- 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 Engineering/Geoscience Professional's Organization's own forces or by others
- Engineering or geoscience work carried out for internal use by the Engineering/Geoscience Professional's Organization or for use by others

## 9.3 HOW DOES THE OQM PROGRAM APPLY IN VARIOUS SECTORS

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Information on how the OQM Program may apply in different sectors is presented in **Section 9.8: Resources** under **Table 9-2: Examples of OQM Applied in Various Sectors** .

## 9.4 WHAT IS OQM CERTIFICATION

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Engineers and Geoscientists BC will grant OQM certification to Organizations that demonstrate that they have met the following criteria:

1. The Organization has Engineering/Geoscience Professionals on Active Staff for each area of engineering and geoscience practice that it undertakes.
2. The Organization has implemented policies and procedures that are consistent with the Quality Management Requirements listed below and described in this manual:
  - The Organization’s Engineering/Geoscience Professionals apply all relevant Engineers and Geoscientists BC professional 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 Engineering/Geoscience Professionals is consistent with the respective Quality Management Requirement.
  - Engineering/Geoscience Professionals within the Organization are directly supervising all engineering and geoscience work that they delegate.
  - Engineering/Geoscience 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 Engineering/Geoscience 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 can also become OQM-certified.

## 9.5 WHY IS OQM CERTIFICATION IMPORTANT TO ORGANIZATIONS

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Engineers and Geoscientists BC implemented the OQM certification program to recognize Organizations that have satisfactorily demonstrated that they have policies and procedures consistent with the Quality Management Requirements in place and used by their Engineering/Geoscience Professionals.

Benefits of OQM certification include the following:

- Recognition and brand-building is associated with OQM certification
- OQM certification is being included, along with other important qualifications, in selection criteria for engineering and geoscience products and services
- Based on first-hand experience, OQM-certified Organizations are seen as delivering better quality products and services
- Employee engagement and loyalty as a result of supporting the Engineering/Geoscience Professionals in meeting their professional obligations
- Improved risk management
- Efficiency gains through the certification process
- No employee time lost to random practice reviews
- Professional liability insurance discounts

Engineering/Geoscience Professionals in Organizations that have OQM certification will not be subject to random selection for Engineers and Geoscientists BC 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.

## 9.6 WHAT IS THE OQM CERTIFICATION PROCESS

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Following is the certification process (see also **Figure 9-1: OQM Certification Process Flowchart**):

- Initiate the Organization's participation in the OQM certification process by signing up via the OQM Sign Up Form web page ([www.egbc.ca/oqm-sign-up](http://www.egbc.ca/oqm-sign-up)).
- Register online for an Organization representative to attend an OQM Certification Training Session by going to the Events web page ([www.egbc.ca/Events](http://www.egbc.ca/Events)) and searching for the term "OQM." Attendees are not required to be Engineers and Geoscientists BC members.

- Compile the Organization's Quality Management documents. Use of the OQM Launch Assist service is available after a representative has attended an OQM Certification Training Session. OQM Launch Assist is where an independent consultant is made available to help the Organization draft their Quality Management manual (complete details are provided during the training session).
- Complete the online application form and upload the Organization's Quality Management documents via the Engineers and Geoscientists BC OQM Portal ([www.egbc.ca/oqmportal](http://www.egbc.ca/oqmportal)).
- Engineers and Geoscientists BC will conduct a level 1 audit (detail document review) of the application package.
- If the documents do not meet the OQM certification criteria, an auditor will provide a detailed report and provide guidance on how to revise the document(s) so they do meet the certification criteria.
- Engineers and Geoscientists BC will issue OQM certification and mail out a welcome letter, OQM certificates, and all supporting documentation, including a trademark licensing agreement granting the Organization license to use the OQM logo and represent itself as an OQM-certified Organization.
- Engineers and Geoscientists BC publishes the names of all Organizations that have current OQM certificates on their website ([www.egbc.ca/Practice-Resources/Organizational-Quality-Management-Program/OQM-Certified-Organizations](http://www.egbc.ca/Practice-Resources/Organizational-Quality-Management-Program/OQM-Certified-Organizations)).
- Engineers and Geoscientists BC will issue annual renewal notices to OQM-certified Organizations in May of each year (the annual renewal date is June 30).
- Within the first five years of the OQM Program and each succeeding five-year period, each OQM Organization will undergo an OQM level 2 (site) audit. Engineers and Geoscientists BC auditors will carry out the audit to confirm that the Organization has documented and implemented policies and procedures consistent with all of the Quality Management Requirements (see **Table 9-1: 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, will include a minimum number of offices (calculated as the square root of the total number of BC offices), including the Organization's main BC office.
- Organizations that fail to demonstrate in the OQM audit that they continue to meet the Quality Management Requirements will be advised of required corrective action(s) and will be given 30 days to submit a corrective action plan, complete with timing of the actions to be taken. If the Organization fails to take appropriate corrective actions within a reasonable amount of time, Engineers and Geoscientists BC may revoke the Organization's OQM certification.

## 9.7 WHAT WILL BE COVERED IN AN OQM AUDIT

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In the OQM audits, Organizations must demonstrate that they are meeting the intent of all Quality Management Requirements. The detailed requirements are included in the OQM Audit Checklist (see **Table 9-1: OQM Audit Checklist**).

OQM audits are process-based, help the Organization understand how well their policies and procedures are working, and identify areas where improvements can be made to mitigate risk, streamline processes, and support the Engineering/Geoscience Professionals they employ.

## 9.8 RESOURCES

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- **Figure 9-1: OQM Certification Process Flowchart**
- **Table 9-1: OQM Audit Checklist**
- **Table 9-2: Examples of OQM Applied in Various Sectors**
- **Table 9-3: OQM Certification Fees**

## 9.9 OQM APPLICATION (ONLINE)

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The OQM application process is online and accessible to those designated as the OQM Portal User for the Organization. When the Organization signs up for OQM certification via the OQM Sign Up Form web page ([www.egbc.ca/oqm-sign-up](http://www.egbc.ca/oqm-sign-up)), the individual named as the Organization liaison is designated the OQM Portal User for the Organization. To add or change individuals as OQM Portal Users, email a request to [OQM@egbc.ca](mailto:OQM@egbc.ca).

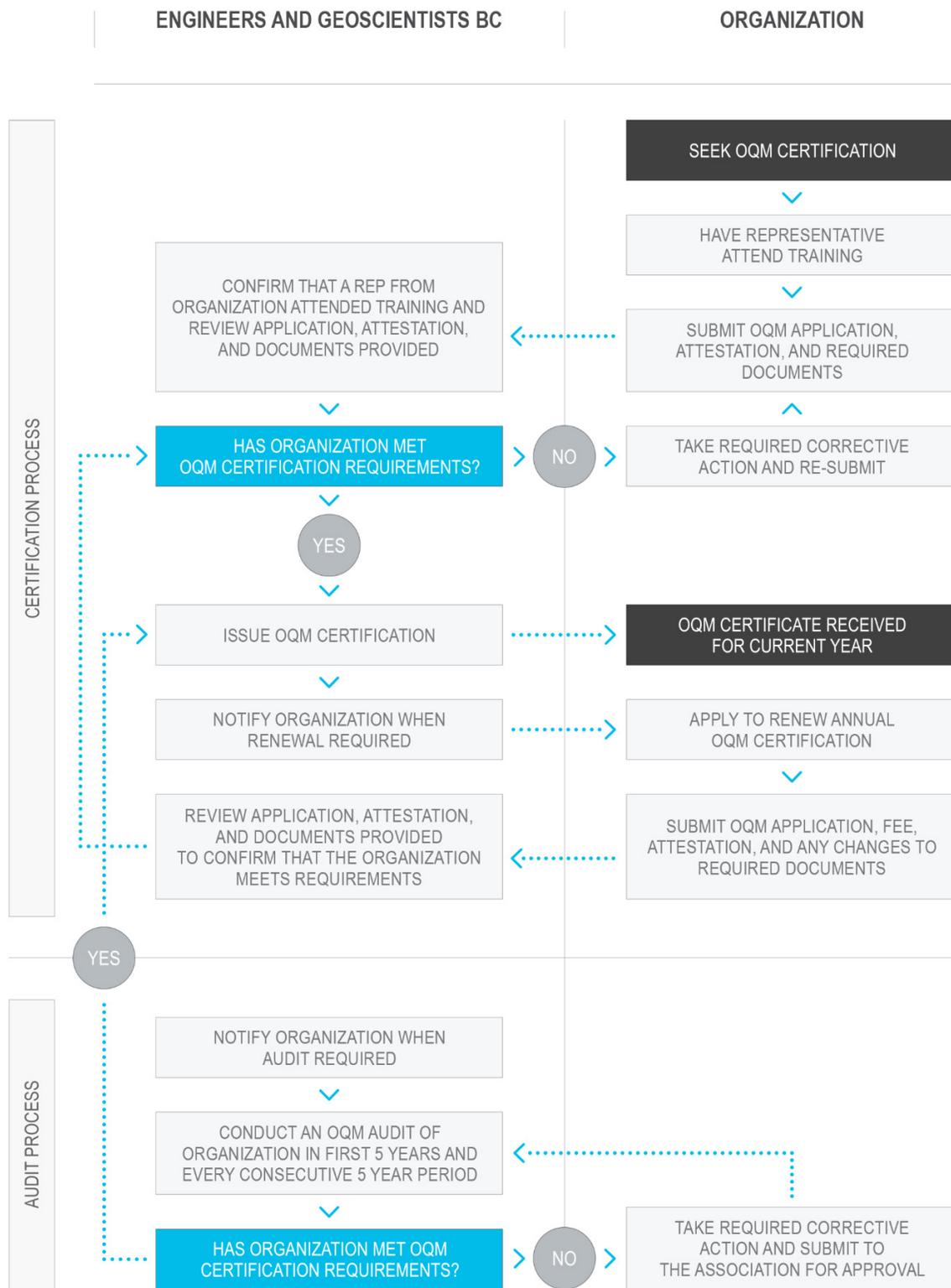


FIGURE 9-1: OQM Certification and Audit Process

Where an Organization chooses not to take the corrective action identified in the OQM audit, Engineers and Geoscientists BC will revoke its OQM certificate

TABLE 9-1: OQM Audit Checklist

OQM CERTIFICATION REQUIREMENTS	YES	NO	NOT APPLI-CABLE	REFERENCE OR COMMENTS
<b>SECTION 2: ENGINEERS AND GEOSCIENTISTS BC PROFESSIONAL PRACTICE GUIDELINES</b>				
<b>REQUIREMENT:</b> Explicitly require that Engineering/Geoscience Professionals comply with Engineers and Geoscientists BC professional practice guidelines related to engineering or geoscience work they undertake				
<ul style="list-style-type: none"> <li>Organization communicates and reinforces this requirement</li> </ul>				
<ul style="list-style-type: none"> <li>Organization periodically confirms that the requirement is being met</li> </ul>				
<ul style="list-style-type: none"> <li>Organization can demonstrate that it has implemented policies and procedures consistent with this requirement</li> </ul>				
<ul style="list-style-type: none"> <li>Organization can demonstrate that its Engineering/Geoscience Professionals are using and meeting the intent of Engineers and Geoscientists BC professional practice guidelines related to their engineering and geoscience work (identify applicable Engineers and Geoscientists BC guidelines and seek evidence of knowledge and use by the Organization's Engineering/Geoscience Professionals)</li> </ul>				
<b>SECTION 3: RETAINING PROJECT DOCUMENTATION</b>				
<b>REQUIREMENT:</b> 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				
<ul style="list-style-type: none"> <li>Organization has a documented process in place to manage engineering or geoscience documentation</li> </ul>				
<ul style="list-style-type: none"> <li>The process and related policies and procedures communicated to those involved in the engineering or geoscience projects or work</li> </ul>				
<ul style="list-style-type: none"> <li>Engineering or geoscience documentation that must be retained is defined and/or identified</li> </ul>				
<ul style="list-style-type: none"> <li>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</li> </ul>				

TABLE 9-1: OQM Audit Checklist

OQM CERTIFICATION REQUIREMENTS	YES	NO	NOT APPLI-CABLE	REFERENCE OR COMMENTS
<ul style="list-style-type: none"> <li>• Engineering or geoscience project or work files are stored in a file structure that is consistent across projects or work</li> </ul>				
<ul style="list-style-type: none"> <li>• The Organization uses one of the following options for the primary filing system:</li> </ul>				
<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>– Organization uses electronic media for its primary filing system</li> </ul> </li> </ul>				
<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>– Organization uses hard copy for its primary filing system</li> </ul> </li> </ul>				
<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>– 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</li> </ul> </li> </ul>				
<ul style="list-style-type: none"> <li>• Users are able to readily find and retrieve engineering and geoscience documentation for projects or work currently underway</li> </ul>				
<ul style="list-style-type: none"> <li>• Organization is able to demonstrate that it retains complete engineering or geoscience documentation for a minimum of 10 years</li> </ul>				
<ul style="list-style-type: none"> <li>• Retained project documentation is retrievable and legible (hard copy) or readable (electronic)</li> </ul>				
<ul style="list-style-type: none"> <li>• 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 check-out procedures, or other means)</li> </ul>				
<ul style="list-style-type: none"> <li>• 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, version control, professional seals, or other means)</li> </ul>				
<ul style="list-style-type: none"> <li>• Organization can demonstrate that the documents they retain can be trusted (e.g., review procedures to check accuracy, completeness, correctness).</li> </ul>				
<ul style="list-style-type: none"> <li>• Controls are in place for documents received by the Organization</li> </ul>				

TABLE 9-1: OQM Audit Checklist

OQM CERTIFICATION REQUIREMENTS	YES	NO	NOT APPLI-CABLE	REFERENCE OR COMMENTS
<b>SECTION 4: DOCUMENTED CHECKING OF ENGINEERING AND GEOSCIENCE WORK</b>				
<b>REQUIREMENT:</b> The Organization is carrying out documented checks of engineering and geoscience work using a documented process appropriate to the risk associated with the work carried out				
<ul style="list-style-type: none"> <li>• A documented process is in place to address documented checking of engineering and geoscience work appropriate to the level of risk of work undertaken</li> </ul>				
<ul style="list-style-type: none"> <li>• The documented process and related policies and procedures are communicated to those involved in the engineering or geoscience projects or work</li> </ul>				
<ul style="list-style-type: none"> <li>• Input requirements for engineering and geoscience work are confirmed and recorded before work is carried out</li> </ul>				
<ul style="list-style-type: none"> <li>• 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</li> </ul>				
<ul style="list-style-type: none"> <li>• Where needed or required, concept reviews or independent reviews are carried out</li> </ul>				
<ul style="list-style-type: none"> <li>• Engineering or geoscience calculations are checked and a record of the check is kept</li> </ul>				
<ul style="list-style-type: none"> <li>• 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</li> </ul>				
<ul style="list-style-type: none"> <li>• Qualified checkers are performing the checks</li> </ul>				
<ul style="list-style-type: none"> <li>• Controls are in place for the use of self-checks</li> </ul>				
<ul style="list-style-type: none"> <li>• Records of checks include who carried out the check, when, issues of substance identified, and any resulting correction or corrective action taken</li> </ul>				

TABLE 9-1: OQM Audit Checklist

OQM CERTIFICATION REQUIREMENTS	YES	NO	NOT APPLI-CABLE	REFERENCE OR COMMENTS
<b>SECTION 5: INDEPENDENT REVIEWS OF STRUCTURAL DESIGN</b>				
<b>REQUIREMENT:</b> Engineering/Geoscience 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 guideline.				
Does the Organization prepare structural designs? If no, go to Section 6.				
Do all of the structural designs prepared by the Organization 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 Guide for Wood Frame Construction</i> ? If yes, go to Section 6.				
<ul style="list-style-type: none"> <li>Organization has a documented process in place to conduct independent review of structural designs</li> </ul>				
<ul style="list-style-type: none"> <li>Process and related policies and procedures are communicated to those involved in structural design</li> </ul>				
<ul style="list-style-type: none"> <li>Level of detail and extent of reviews are based on the assessed risk</li> </ul>				
<ul style="list-style-type: none"> <li>Organization can demonstrate that independent reviews of structural designs are taking place before documents are issued for construction</li> </ul>				
<ul style="list-style-type: none"> <li>Where Organizations carry out repetitive designs of individual structural components, the Organization can demonstrate that independent reviews of the initial design are conducted, and at appropriate intervals in the future as deemed necessary</li> </ul>				
<ul style="list-style-type: none"> <li>Engineering/Geoscience Professionals who are 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</li> </ul>				
<ul style="list-style-type: none"> <li>Independent structural reviewers are appropriately qualified and have not been involved in preparing designs they review</li> </ul>				

TABLE 9-1: OQM Audit Checklist

OQM CERTIFICATION REQUIREMENTS	YES	NO	NOT APPLI-CABLE	REFERENCE OR COMMENTS
<ul style="list-style-type: none"> <li>• Documentation provided by the Professional of Record to the independent reviewer is as required by the Quality Management guideline for independent review of structural designs</li> </ul>				
<ul style="list-style-type: none"> <li>• Independent reviews include the following:</li> </ul>				
<ul style="list-style-type: none"> <li>– Design criteria, loads (including loads imposed by components designed by other disciplines and loads from adjacent structures), and performance requirements</li> </ul>				
<ul style="list-style-type: none"> <li>– Geotechnical requirements and material properties</li> </ul>				
<ul style="list-style-type: none"> <li>– Concept and integrity of the gravity and lateral load resisting system</li> </ul>				
<ul style="list-style-type: none"> <li>– Continuity of load paths for both gravity and lateral loads</li> </ul>				
<ul style="list-style-type: none"> <li>– 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</li> </ul>				
<ul style="list-style-type: none"> <li>– 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</li> </ul>				
<ul style="list-style-type: none"> <li>• Independent reviewers discuss concerns with Professionals of Record, as applicable</li> </ul>				
<ul style="list-style-type: none"> <li>• Independent reviewers are providing a formal record of their independent reviews to the Professional of Record highlighting any concerns</li> </ul>				
<ul style="list-style-type: none"> <li>• Where independent reviewers note significant concerns, they request that the Professional of Record revises and resubmits the design documents for independent review</li> </ul>				

TABLE 9-1: OQM Audit Checklist

OQM CERTIFICATION REQUIREMENTS	YES	NO	NOT APPLI-CABLE	REFERENCE OR COMMENTS
<ul style="list-style-type: none"> <li>Professionals of Record are adequately resolving concerns noted in the independent reviews and documenting the rationale for their actions</li> </ul>				
<ul style="list-style-type: none"> <li>Adequate records of independent reviews and resulting actions are retained</li> </ul>				
<b>SECTION 6: USE OF SEAL</b>				
<b>REQUIREMENT:</b> Engineering/Geoscience Professionals employed by the Organization 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 they contain.				
<ul style="list-style-type: none"> <li>Organization has policies and procedures in place for managing the use of professional seals</li> </ul>				
<ul style="list-style-type: none"> <li>Policies and procedures are documented and communicated to those involved in document preparation</li> </ul>				
<ul style="list-style-type: none"> <li>Documents that require sealing are being sealed by Engineering/Geoscience Professionals acting in their professional capacity or directly supervising the work contained in the documents</li> </ul>				
<ul style="list-style-type: none"> <li>Documents are being sealed by the Engineering/Geoscience Professional with the lowest level of direct professional responsibility for the work (see definition of Professional of Record)</li> </ul>				
<ul style="list-style-type: none"> <li>Documents are being sealed, signed, and dated in an appropriate location</li> </ul>				
<ul style="list-style-type: none"> <li>Decisions about when to seal documents are being made by the Professional of Record</li> </ul>				
<ul style="list-style-type: none"> <li>Before sealing a document, the Professional of Record is reviewing the document and has accepted professional responsibility for its content</li> </ul>				
<ul style="list-style-type: none"> <li>Master documents that can be altered and reproduced are <b>not</b> being sealed unless an electronic seal with digital certification is used</li> </ul>				

TABLE 9-1: OQM Audit Checklist

OQM CERTIFICATION REQUIREMENTS	YES	NO	NOT APPLI-CABLE	REFERENCE OR COMMENTS
<ul style="list-style-type: none"> <li>• Type of seal used in Organization:</li> </ul>				
<ul style="list-style-type: none"> <li>– Hard copies of documents are sealed using ink seals, signatures, and dates</li> </ul>				
<ul style="list-style-type: none"> <li>– Digital copies of documents are sealed with an electronic version of the seal and a digital certificate to validate the electronic seal</li> </ul>				
<ul style="list-style-type: none"> <li>• 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</li> </ul>				
<ul style="list-style-type: none"> <li>• Where electronic seals are being used, they have been purchased from Engineers and Geoscientists BC</li> </ul>				
<ul style="list-style-type: none"> <li>• Where digital certificates are being used, the service provider has been independently confirmed to be meeting the Engineers and Geoscientists BC best practices, or is approved by Engineers and Geoscientists BC</li> </ul>				
<ul style="list-style-type: none"> <li>• 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</li> </ul>				
<ul style="list-style-type: none"> <li>• Engineering and geoscience decisions or opinions sent in the bodies of emails are followed up with sealed documents</li> </ul>				
<ul style="list-style-type: none"> <li>• Engineering/Geoscience Professionals are only sealing documents prepared in languages in which they are fluent</li> </ul>				
<ul style="list-style-type: none"> <li>• Sealed documents (whether hard copy and digital) are retained as records</li> </ul>				

TABLE 9-1: OQM Audit Checklist

OQM CERTIFICATION REQUIREMENTS	YES	NO	NOT APPLI-CABLE	REFERENCE OR COMMENTS
<b>SECTION 7: DIRECT SUPERVISION</b>				
<b>REQUIREMENT:</b> Professionals of Record are directly supervising any engineering or geoscience work they delegate.				
<ul style="list-style-type: none"> <li>• Organization has policies and procedures in place for managing the delegation of engineering and geoscience work</li> </ul>				
<ul style="list-style-type: none"> <li>• Policies and procedures are documented and communicated to those involved in delegating or carrying out delegated work</li> </ul>				
<ul style="list-style-type: none"> <li>• Engineering/Geoscience Professionals are actively involved in work they delegate by:</li> </ul>				
<ul style="list-style-type: none"> <li>– having knowledge of all stages of the project or work</li> </ul>				
<ul style="list-style-type: none"> <li>– having knowledge of the development or history of the project or work</li> </ul>				
<ul style="list-style-type: none"> <li>– providing input on earlier drafts</li> </ul>				
<ul style="list-style-type: none"> <li>– reviewing particular elements in earlier stages</li> </ul>				
<ul style="list-style-type: none"> <li>– being regularly consulted throughout the project or work</li> </ul>				
<ul style="list-style-type: none"> <li>• Engineering/Geoscience Professionals are providing appropriate supervision by:</li> </ul>				
<ul style="list-style-type: none"> <li>– being located in the same workplace as or regularly communicating with the subordinate</li> </ul>				
<ul style="list-style-type: none"> <li>– being available to the subordinate during the project or work</li> </ul>				
<ul style="list-style-type: none"> <li>– periodically reviewing the subordinate's work</li> </ul>				
<ul style="list-style-type: none"> <li>– being consulted throughout the project or work and not just at the final stage</li> </ul>				

TABLE 9-1: OQM Audit Checklist

OQM CERTIFICATION REQUIREMENTS	YES	NO	NOT APPLI-CABLE	REFERENCE OR COMMENTS
<ul style="list-style-type: none"> <li>• Engineering/Geoscience Professionals are adequately supervising field reviews by:</li> </ul>				
<ul style="list-style-type: none"> <li>– assessing circumstances to determine if delegating field reviews is appropriate</li> </ul>				
<ul style="list-style-type: none"> <li>– assessing complexity and critical nature of field review to determine whether the subordinate can provide the required level of quality and accuracy</li> </ul>				
<ul style="list-style-type: none"> <li>– assessing whether the subordinate has the required level of training and experience for the field review</li> </ul>				
<ul style="list-style-type: none"> <li>– 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</li> </ul>				
<ul style="list-style-type: none"> <li>– giving instructions including what to confirm, test, record, and report</li> </ul>				
<ul style="list-style-type: none"> <li>– being involved in making any engineering or geoscience decisions or judgments required in the field</li> </ul>				
<ul style="list-style-type: none"> <li>– reviewing and following up on field reports</li> </ul>				
<ul style="list-style-type: none"> <li>• Engineering/Geoscience Professionals are involved in all engineering and geoscience decisions by:</li> </ul>				
<ul style="list-style-type: none"> <li>– being available to answer subordinate’s questions about decisions</li> </ul>				
<ul style="list-style-type: none"> <li>– 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</li> </ul>				
<ul style="list-style-type: none"> <li>– reviewing each engineering and geoscience decision and the reasons for making it</li> </ul>				

TABLE 9-1: OQM Audit Checklist

OQM CERTIFICATION REQUIREMENTS	YES	NO	NOT APPLI-CABLE	REFERENCE OR COMMENTS
<ul style="list-style-type: none"> <li>• Engineering/Geoscience Professionals are providing supervision appropriate to the experience of the subordinate by:</li> </ul>				
<ul style="list-style-type: none"> <li>– assessing experience levels and setting up an appropriate supervision plan</li> </ul>				
<ul style="list-style-type: none"> <li>– assigning broader or multi-stepped tasks with decreasing frequency of reviews as subordinate’s experience increases</li> </ul>				
<ul style="list-style-type: none"> <li>– being available to answer subordinate’s questions and provide direction</li> </ul>				
<b>SECTION 8: FIELD REVIEWS</b>				
<p><b>REQUIREMENT:</b> Engineering/Geoscience Professionals 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</p>				
<ul style="list-style-type: none"> <li>• The Organization’s Engineering/Geoscience Professionals are using a documented process to carry out field reviews</li> </ul>				
<ul style="list-style-type: none"> <li>• Engineering/Geoscience Professionals are not predetermining the number of field reviews required</li> </ul>				
<ul style="list-style-type: none"> <li>• Appropriate criteria including level of risk is being used by Engineering/Geoscience Professionals to assess the extent of field reviews</li> </ul>				
<ul style="list-style-type: none"> <li>• Field reviews appropriate to the work are being carried out during the implementation or construction</li> </ul>				
<ul style="list-style-type: none"> <li>• Where possible, field reviews are being carried out by the Professional of Record or someone under his or her direct supervision</li> </ul>				
<ul style="list-style-type: none"> <li>• Engineering/Geoscience Professionals have appropriate documented protocols in place for situations where the client, owner, or employer decides to use someone other than the Professional of Record to carry out field review</li> </ul>				
<ul style="list-style-type: none"> <li>• Field reviews are occurring at critical points in the implementation or construction</li> </ul>				

TABLE 9-1: OQM Audit Checklist

OQM CERTIFICATION REQUIREMENTS	YES	NO	NOT APPLI-CABLE	REFERENCE OR COMMENTS
<ul style="list-style-type: none"> <li>Where critical work has been covered up before a field review, Engineering/Geoscience 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</li> </ul>				
<ul style="list-style-type: none"> <li>Engineering/Geoscience Professionals are advising their client, the owner or the employer when more field reviews are required and why</li> </ul>				
<ul style="list-style-type: none"> <li>Engineering/Geoscience 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</li> </ul>				
<ul style="list-style-type: none"> <li>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</li> </ul>				
<ul style="list-style-type: none"> <li>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</li> </ul>				
<ul style="list-style-type: none"> <li>Nonconforming work observed in field reviews is being tracked until the work is rectified as directed by the field reviewer</li> </ul>				
<ul style="list-style-type: none"> <li>All field reviews are being documented</li> </ul>				
<ul style="list-style-type: none"> <li>A procedure is in place, and being implemented, for the creation and storage of any photographic or video records</li> </ul>				
<ul style="list-style-type: none"> <li>Field review documentation is being retained as a record</li> </ul>				

TABLE 9-2: Examples of OQM Applied in Various Sectors

TYPE OF ORGANIZATION	CONSULTING	MANUFACTURING	TECHNOLOGY	REGULATORY AUTHORITY
<b>ROLE OF THE ORGANIZATION</b>	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 Engineering/Geoscience Professionals	Review, acceptance, or approval of engineering or geoscience work submitted to the authority
<b>SECTION 2: ENGINEERS AND GEOSCIENTISTS BC PROFESSIONAL PRACTICE GUIDELINES</b>	Require that all Engineering/Geoscience Professionals employed by the Organization comply with the intent of Engineers and Geoscientists BC professional practice guidelines related to the engineering or geoscience work they undertake	Require that all Engineering/Geoscience Professionals employed by the Organization comply with the intent of Engineers and Geoscientists BC professional practice guidelines related to the engineering or geoscience work they undertake	Require that all Engineering/Geoscience Professionals employed by the Organization comply with the intent of Engineers and Geoscientists BC professional practice guidelines related to the engineering or geoscience work they undertake	Require that Engineering/Geoscience Professionals, acting for, or submitting engineering or geoscience documents to, the authority, be familiar and consistent with the intent of Engineers and Geoscientists BC professional practice guidelines that are applicable to the work being submitted to the authority for review, acceptance, or approval
<b>SECTION 3: RETAINING PROJECT DOCUMENTATION</b>	Establish and implement a records management system to retain documentation related to engineering or geoscience projects	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
<b>SECTION 4: DOCUMENTED CHECKING PROCESS</b>	Establish and implement a documented checking process that indicates checks are required throughout engineering and geoscience projects undertaken by the Organization	Establish and implement a documented checking process that indicates checks are required of ongoing engineering and geoscience work carried out by the Organization	Establish and implement a documented checking process that indicates checks are required of work carried out by Engineering/Geoscience Professionals employed by the Organization	Establish and implement a documented checking process of reviews carried out by Engineering/Geoscience Professionals acting for the authority or, where concerns arise in submissions from Engineering/Geoscience Professionals, request evidence of their checks of the work including who carried out checks and when
<b>SECTION 5: INDEPENDENT REVIEW OF STRUCTURAL DESIGNS</b>	Establish and implement independent reviews of structural designs, if any, carried out by the Organization	Establish and implement independent reviews of structural designs, if any, carried out by the Organization	Probably not applicable	Confirm that structural designs included in submittals to the authority have undergone required independent structural reviews

TABLE 9-2: Examples of OQM Applied in Various Sectors

TYPE OF ORGANIZATION	CONSULTING	MANUFACTURING	TECHNOLOGY	REGULATORY AUTHORITY
<b>SECTION 6: USE OF SEAL</b>	Establish policies and procedures to have Engineering/Geoscience Professionals employed by the Organization appropriately seal professional documents that they prepare or directly supervise	Establish policies and procedures to have Engineering/Geoscience Professionals employed by the Organization appropriately seal professional documents that they prepare or directly supervise	Establish policies and procedures to have Engineering/Geoscience Professionals employed by the Organization appropriately seal professional documents that they prepare or directly supervise	Require that Engineering/Geoscience Professionals acting for the authority or submitting engineering or geoscience documents to the authority meet the requirements regarding the use of professional seals
<b>SECTION 7: DIRECT SUPERVISION</b>	Establish policies and procedures to have Engineering/Geoscience Professionals employed by the Organization directly supervise any engineering or geoscience work that they delegate	Establish policies and procedures to have Engineering/Geoscience Professionals employed by the Organization directly supervise any engineering or geoscience work that they delegate	Establish policies and procedures to have Engineering/Geoscience Professionals employed by the Organization directly supervise any engineering or geoscience work that they delegate	Require that the delegation of engineering or geoscience work by Engineering/Geoscience Professionals acting for the authority meets the requirement of being under the Engineering/Geoscience Professional's direct supervision. Where concerns arise with submissions to the authority, request records to confirm submissions prepared by non-Engineering/Geoscience Professionals have been prepared under appropriate direct supervision
<b>SECTION 8: FIELD REVIEW</b>	Establish and implement documented field reviews of engineering and geoscience projects during construction by or under the direct supervision of the Professional of Record 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 Professional of Record 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 Engineering/Geoscience Professionals, 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

TABLE 9-3: OQM Certification Fees

OQM CERTIFICATION FEES	
<b>FORMULA FOR DETERMINING OQM CERTIFICATION FEES</b>	
<ul style="list-style-type: none"> <li>Organizations pay \$200 per attendee to attend an OQM Certification Training Session.</li> </ul>	
<ul style="list-style-type: none"> <li>Upon submission of the Organization's OQM application, Engineers and Geoscientists BC 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.</li> </ul>	
<ul style="list-style-type: none"> <li>The fees cover certification and an OQM audit by Engineers and Geoscientists BC once every five years.</li> </ul>	
<ul style="list-style-type: none"> <li>The calculation for OQM certification fees uses the number of Engineering/Geoscience Professionals employed by the Organization applying for OQM certification. This does not include EITs or GITs.</li> </ul>	
<ul style="list-style-type: none"> <li>The annual fees for OQM certification are calculated using the following formula:                             <ul style="list-style-type: none"> <li>OQM Certification Fees = <math>\\$200 * \sqrt{N}</math></li> <li>Where <math>N</math> = number of Engineering/Geoscience Professionals in the Organization (does not include EITs or GITs) applying for OQM certification, and the square root of <math>N</math> (<math>\sqrt{N}</math>) is rounded to a whole number using standard rounding rules.</li> </ul> </li> </ul>	
<b>EXAMPLES OF FEES PAYABLE</b>	
The following table gives some examples of fees payable using this formula:	

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

TABLE 9-3: OQM Certification Fees

OQM CERTIFICATION FEES
<b>OQM CERTIFICATION FOR MULTI-OFFICE ORGANIZATIONS</b>
<ul style="list-style-type: none"> <li>Engineers and Geoscientists BC 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.</li> </ul>
<ul style="list-style-type: none"> <li>The minimum number is calculated using the following formula:                             <ul style="list-style-type: none"> <li>Minimum number of offices audited = <math>\sqrt{O}</math></li> <li>Where <math>O</math> = 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.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>The annual fee for OQM certification for multi-office Organizations is the same as the fee for single-office Organizations.</li> </ul>
<ul style="list-style-type: none"> <li>Organizations having multiple offices within BC that choose to have more offices audited than the minimum required under the formula must pay for such audits on a cost-recovery basis.</li> </ul>
<ul style="list-style-type: none"> <li>Engineers and Geoscientists BC is available to review with an Organization the costs associated with carrying out such additional audits of offices.</li> </ul>
<b>OUT-OF-PROVINCE ORGANIZATIONS</b>
<ul style="list-style-type: none"> <li>Engineers and Geoscientists BC will accept OQM applications for Organizations that do not have a fixed office in BC and wish to become OQM-certified.</li> </ul>
<b>RE-AUDITING</b>
<ul style="list-style-type: none"> <li>Where OQM audit deficiencies are identified that require a re-audit (major nonconformances), Engineers and Geoscientists BC will re-audit on a cost-recovery basis.</li> </ul>

# APPENDIX A: ENGINEERS AND GEOSCIENTISTS BC QUALITY MANAGEMENT GUIDELINES

The following Engineers and Geoscientists BC Quality Management guidelines provide Engineering/Geoscience Professionals with guidance to the Quality Management Requirements in the *Act* and Bylaws; they are listed here as reference for users of the *OQM Manual*.

These guidelines are directed at Engineering/Geoscience Professionals and set out the standard of practice expected of them.

These guidelines are not intended for nor do they provide any direction to Organizations.

Engineers and Geoscientists BC publishes the following Quality Management guidelines:

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

Digital copies are available on the Engineers and Geoscientists BC website ([www.egbc.ca/Quality-Management-Guidelines](http://www.egbc.ca/Quality-Management-Guidelines)).





