



QUALITY MANAGEMENT GUIDELINES

DOCUMENTED FIELD REVIEWS DURING IMPLEMENTATION OR CONSTRUCTION

VERSION 1.3

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**ENGINEERS &
GEOSCIENTISTS**
BRITISH COLUMBIA

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ABBREVIATIONS

ABBREVIATION	TERM
BC	British Columbia
QM	Quality Management

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1.0 DEFINITIONS

The following definitions are specific to this Quality Management (QM) guideline.

TERM	DEFINITION
Act	<i>Engineers and Geoscientists Act</i> [RSBC 1996] Chapter 116.
Bylaws	The Bylaws of Engineers and Geoscientists BC made under the <i>Act</i> .
Domestic Projects	Engineering or geoscience projects or work located in Canada and for which an Engineering/Geoscience Professional meets the registration requirements for the engineering or geoscience regulatory body having jurisdiction.
Engineering/Geoscience Professional(s)	Professional engineers, professional geoscientists, and licensees who are licensed to practice by Engineers and Geoscientists BC
Engineers and Geoscientists BC	The Association of Professional Engineers and Geoscientists of the Province of British Columbia, also operating as Engineers and Geoscientists BC.
Field Review	<p>The reviews conducted at the site of the implementation or construction 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 implementation or construction 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.</p> <p>For example, Field Reviews are defined in the <i>BC Building Code</i> to mean those reviews of the work</p> <ul style="list-style-type: none"> (a) at a project site of a development to which a building permit relates, and (b) where applicable, at fabrication locations where building components are fabricated for use at the project site <p>that a registered professional in his or her professional discretion considers necessary to ascertain whether the work substantially complies in all material respects with the plans and supporting documents prepared by the registered professional for which the building permit is issued.</p>

TERM	DEFINITION
Field Reviewer	Unless another qualified party is selected by the client, owner, or employer to carry out Field Review, the Field Reviewer is the Professional of Record, or an individual under the direct supervision of the Professional of Record, who carries out the Field Review.
Organization	Any firm, corporation, partnership, government agency, sole proprietor, or other type of legal entity that employs Engineering/Geoscience Professionals and provides products and/or services requiring the application of professional engineering and/or professional geoscience.
Professional of Record	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.
Record (Documentation)	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.

2.0 PURPOSE AND SCOPE

- 2.1 Bylaw 14 states:
- “(b) Members and licensees shall establish and maintain documented quality management processes for their practices, which shall include, as a minimum:
- (3) documented field reviews by, or under the direct supervision of, members or licensees, of their domestic projects during implementation or construction;”
- 2.2 Proper and appropriate Field Reviews are fundamental to upholding the Engineers and Geoscientists BC Code of Ethics, which requires that all Engineering/Geoscience Professionals hold paramount the safety, health, and welfare of the public, the protection of the environment, and promote health and safety within the workplace.
- 2.3 As required by the Bylaws, Engineering/Geoscience Professionals must meet the Field Review requirements for all domestic engineering and geoscience works or projects for which they are responsible. Refer to **Section 3.6 Who is Permitted to Carry Out Field Reviews** of this QM guideline for further information.
- 2.4 This QM guideline is intended to assist Engineering/Geoscience Professionals in establishing and maintaining a documented process for Field Reviews that meets Bylaw 14(b)(3) by addressing the following:
- Purpose and extent of Field Reviews
 - What is included and not included in a Field Review
 - When Field Reviews should occur
 - Who is qualified to conduct a Field Review
 - How to carry out, document, and address issues identified in Field Reviews
- 2.5 To comply with the Bylaws, Engineering/Geoscience Professionals must have established, or have access to, a documented QM process that includes performing or directly supervising and documenting Field Reviews of their Domestic Projects during implementation or construction.
- 2.6 A documented process is one that has been thought out and reduced to writing in suitable form. The process may be captured in a written procedure, process flowchart, checklists, forms to record Field Reviews, or other documentation developed to suit the nature of the work undertaken by the Engineering/Geoscience Professional.

2.7 These obligations apply to Engineering/ Geoscience Professionals working in their professional capacity in all sectors when their work applies to or is used in any of the following circumstances:

- 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 such as 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 use internally by the Engineering/ Geoscience Professional's Organization
- Engineering or geoscience work carried out for others

2.8 Terminology used across sectors may vary from terminology used in this QM guideline. However, the intent and obligations of Engineering/Geoscience Professionals acting in their professional capacity in all sectors

remain the same. Sectors may include, but are not limited to the following:

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

2.9 The following examples may assist in illustrating how Field Reviews may occur and what they may include, in a project situation and in a situation involving ongoing work.

Example 1: Consulting

Engineering or geoscience documents are prepared by, or under the direct supervision of, the Professional of Record. The work is put out to tender and a contractor is selected to construct the work.

- In this instance, the Professional of Record or subordinate carries out periodic Field Reviews to confirm that the construction conforms to the engineering or geoscience concepts or intent reflected 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 reflected in the engineering or geoscience documents prepared for the work.

2.10

This QM guideline is a minimum standard for Engineering/Geoscience Professionals. Failure to meet the intent of this QM guideline may be evidence of unprofessional conduct and may give rise to disciplinary proceedings by Engineers and Geoscientists BC.

3.0 GUIDELINES FOR PRACTICE

3.1 WHAT IS THE PURPOSE OF A FIELD REVIEW

- 3.1.1 Field Reviews are periodic reviews, conducted at the site of the implementation or construction 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 implementation or construction 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. Field Reviews also help Engineering/Geoscience Professionals keep their employer, client, owner, and other relevant professionals informed about the quality of the implementation or construction work as it pertains to compliance with the engineering or geoscience documents prepared for the work.
- 3.1.2 As is clear from the definition of Field Reviews, the number and extent of Field Reviews must always remain in the discretion of the Engineering/Geoscience Professional. Consequently, it is contrary to the Engineering/Geoscience Professional's obligations for the Engineering/Geoscience Professional to agree in advance to a fixed number or

extent of Field Reviews in their agreement with their employer, client, owner, or anyone else. It is appropriate for the Engineering/Geoscience Professional to provide to their employer, client, or the owner an estimate of the number of anticipated Field Reviews and/or the cost per Field Review attendance at the site.

3.2 WHAT ARE FIELD REVIEWS NOT INTENDED TO DO

- 3.2.1 Field Reviews are not supervision of the implementation or construction work, nor are they a guarantee that all deficient work will be identified by the Engineering/Geoscience Professional or subordinate. The contractor or other party implementing or constructing the work is responsible for supervising the work, delivering work that is in conformity with the engineering or geoscience documents, and deciding the means and methods for doing so. The Field Reviewer observes the contractor's work to ascertain whether 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, and may reject nonconforming work, but leave the means and methods for achieving what is required to the contractor or others who are tasked with implementing or constructing the work.

3.2.2 Field Reviews are also not an inspection of the work or safety at a contractor-controlled site or a site managed by others, nor are they a review of the relevant 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.

3.2.3 In any event, when an Engineering/Geoscience Professional becomes aware of a safety violation or concern, he or she must advise the appropriate party in control of the site or responsible for the site safety and, if no action is taken, then advise the client or relevant authorities. When actions taken fail, and an Engineering/Geoscience Professional believes that workers or the public are in imminent danger, he or she has a professional duty to act to stop the work. If the Engineering/Geoscience Professional's attempts to stop the dangerous work fail, the Engineering/Geoscience Professional should call WorkSafeBC or a similar organization for assistance and indicate the urgency of the situation. When this level of action becomes necessary it must be documented.

3.3 HOW OFTEN SHOULD FIELD REVIEWS TAKE PLACE

3.3.1 The timing of Field Reviews must be consistent with the following considerations:

- What in the Engineering/Geoscience Professional's discretion he or she considers necessary to ascertain whether the implementation or construction 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

- The level and nature of risk, complexity, unknown conditions, and duration of the implementation or construction
- The standard of practice for the type and nature of work to be reviewed
- Requirements of related Engineers and Geoscientists BC practice guidelines
- Legislation, codes, standards, or other regulatory requirements that may be relevant and applicable to the nature of the Field Review to be carried out
- The level of detail provided in the engineering or geoscience documentation prepared for the project or work
- The experience, reputation, and method of selection (that is, public tender, prequalified bidders, or negotiated) of those implementing or constructing the work
- The number of deficiencies found early in the project or work
- The experience of the Professional of Record

3.3.2 Engineering/Geoscience Professionals must assess the work being carried out and the associated risks to determine the number, extent, frequency, and timing of Field Reviews. The number of reviews must be consistent with the standard of practice in the profession for the specific engineering and geoscience work. Engineering/Geoscience Professionals

should act reasonably, but must not acquiesce to employer, client, or owner demands to conduct fewer Field Reviews than the Engineering/Geoscience Professional believes are necessary. Engineering/Geoscience Professionals must not rely on the fact that an employer, client, owner, regulatory authority, or anyone else is carrying out reviews as a reason to reduce the number of Field Reviews that the Engineering/Geoscience Professional carries out. Educating employers, clients, and owners about the purpose of Field Reviews, and documenting and agreeing in advance about the nature and purpose of Field Reviews, will help to avoid misunderstandings later in the project or work.

3.3.3 The number and frequency of the Field Reviews may need to be adjusted if more deficiencies than expected are found early in the project or work.

3.3.4 If the Engineering/Geoscience Professional determines that the number or extent of Field Reviews that may be referenced in their agreement or scope of work is insufficient, the Engineering/Geoscience Professional must undertake the following actions:

1. Advise the client, owner, or employer about the need and rationale for more Field Reviews.
2. If the client, owner, or employer does not authorize additional Field Reviews, the Engineering/Geoscience Professional must 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.

3.3.5 If the employer, client, or owner continues to refuse to authorize additional Field Reviews, the Engineering/Geoscience Professional must notify the appropriate regulatory body and consider removing himself or herself from the project.

3.4 WHEN SHOULD FIELD REVIEWS OCCUR

3.4.1 Field Reviews must take place at times when critical components of the work are visible and available to be observed. Field Reviews carried out after critical work is covered up are inadequate. If critical work is covered up before a Field Review can occur, the Engineering/Geoscience Professional must consider whether to request that the work be opened up for review. Where uncovering or opening up the work is not feasible or practical, the Engineering/Geoscience Professional must prepare a document about what was observed relevant to the work and the performance of the contractor or those tasked with implementing the work. The Engineering/Geoscience Professional must

also identify and communicate in writing to the employer, client, or owner the consequences of not seeing the work and the reasons for not requiring that the work be uncovered or opened up.

- 3.4.2 Field Reviews should occur periodically to suit the nature and progress of the implementation or construction. Some reviews may be carried out randomly and unannounced so that the Field Reviewer is not observing work only when the contractor or other party implementing the work has had the opportunity to prepare for the Field Review.

3.5 WHAT DO FIELD REVIEWS INCLUDE

- 3.5.1 Field Reviews may simply involve a Field Reviewer visiting the site where the implementation or construction of the engineering or geoscience work reflected in the professional documents occurs; making observations; and communicating observations, interpretations, and advice. In some instances, observations may need to be supplemented with testing or surveying. Testing and analysis should be carried out to recognized standards. Surveying and testing equipment must be periodically calibrated to recognized standards and checked, where possible, before each use. Records of use, calibration, and current status should be maintained. In some sectors, Field Reviews may involve reviewing quality control processes.

- 3.5.2 On occasion, the contractor or others implementing the work will seek advice or direction from the Field Reviewer. Where this advice or direction involves engineering or geoscience decisions, such decisions must be reviewed with the Professional of Record. Where the decisions will have an impact on the cost, quality, function, or schedule of the end product, the Professional of Record must advise, and seek approval from, the employer, client, or owner before directing the contractor or others implementing the work to make any change. The means and methods for fulfilling the advice must always be left to the contractor or others implementing the work.

3.6 WHO IS PERMITTED TO CARRY OUT FIELD REVIEWS

- 3.6.1 The requirement under Bylaw 14(b)(3) is that Field Reviews be carried out by an Engineering/Geoscience Professional or someone suitably qualified under his or her direct supervision as defined in the *Quality Management Guidelines – Direct Supervision* (Engineers and Geoscientists BC 2018a). Where possible and appropriate, the Field Reviewer should be accompanied by a representative of the owner and or the contractor or other party responsible for the implementation or construction.
- 3.6.2 Engineers and Geoscientists BC recommends the Professional of Record responsible for the preparation of the engineering and geoscience documents developed for implementation or construction also be responsible for Field Reviews during implementation or construction. This is

the most common and preferred practice in industry, as it is not only in the best interests of the client, owner, or employer but also best reflects the intent of the Bylaw. The division of responsibilities for the preparation of the engineering and geoscience documents and the carrying out of Field Reviews is undesirable and should be avoided.

- 3.6.3 Engineering/Geoscience Professionals working in other jurisdictions must abide by licensing/registration requirements in those jurisdictions.
- 3.6.4 Refer to **Section 3.7 What If the Professional of Record Is Not Engaged for Field Reviews** of this QM guideline when the Professional of Record responsible for the preparation of the engineering and geoscience documents developed for implementation or construction is not engaged to do Field Reviews.
- 3.6.5 Engineering/Geoscience Professionals may delegate Field Reviews only when the Field Reviews are carried out under their direct supervision. Before doing so, Engineering/Geoscience Professionals must assess the following:
- The level, complexity, and critical nature of the Field Review
 - Requirements or recommendations set out in any related Engineers and Geoscientists BC practice guidelines or other standards, codes, and legislation that may preclude delegation of Field Reviews

- The experience and training of the proposed Field Reviewer
- The proposed Field Reviewer's ability to deliver the required level of quality and accuracy

- 3.6.6 The Professional of Record must provide direction regarding the timing, frequency, and focus of Field Reviews. He or she must give directions about the required effort, reporting detail, and specific aspects of the implementation or construction activities to be Field Reviewed. The Professional of Record must be involved in any engineering or geoscience decisions made during or as a result of the Field Review. See the *Engineers and Geoscientists BC Quality Management Guidelines – Direct Supervision* (Engineers and Geoscientists BC 2018a) for further guidance regarding what constitutes direct supervision of Field Reviews.

3.7 WHAT IF THE PROFESSIONAL OF RECORD IS NOT ENGAGED FOR FIELD REVIEWS

- 3.7.1 The documented QM process referenced in Clause 2.6 of this QM guideline must include protocols to be followed when the Professional of Record responsible for the preparation of the engineering and geoscience documents developed for implementation or construction is not engaged or required by the client, owner, or their employer to carry out Field Reviews during implementation or construction of the engineering or geoscience work.

3.7.2 The protocols should address the following:

1. Obtaining written confirmation from the client, owner, or employer about how and by whom the Field Reviews will be carried out.
2. Confirming that a qualified Engineering/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. Requesting copies of Field Review reports.
5. Retaining a Record of any communication confirming steps 1 to 4 and the client, owner, or employer's response.

3.7.3 For buildings in BC covered by 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*. Refer to the Engineers and Geoscientists BC *Bulletin K: BCBC – Letters of Assurance in the BC Building Code and Due Diligence* (Engineers and Geoscientists BC 2010) under the section entitled Field Reviews, and the *Guide to the Letters of Assurance in*

the BC Building Code issued by the BC Building and Safety Standards Branch.

3.7.4 If the client, owner, or employer does not 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 undertake the following actions:

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.
2. If the client, owner, or employer continues to refuse to authorize an appropriate Field Review, notify the appropriate regulatory body and consider removing him or herself from the project.

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

3.8 HOW SHOULD OUT OF PROVINCE-ENGINEERED AND SUPPLIED EQUIPMENT BE HANDLED

- 3.8.1 Where Engineering/Geoscience Professionals are specifying equipment, products, or components that are designed and manufactured or fabricated out of province for use on projects in BC, they should begin by preparing and sealing a performance specification for the equipment. The specifications should indicate that the manufacturer or fabricator must certify that the equipment meets the performance specifications. This will relieve Engineering/Geoscience Professionals of any requirement to carry out Field Reviews at the place of fabrication.
- 3.8.2 However, when Engineering/Geoscience Professionals receive such equipment, products, or components, they are responsible for checking their quality. If Occupational Health and Safety legislation imposes any requirements such as guards and safety switches, Engineering/Geoscience Professionals are responsible for checking that the equipment meets these requirements. Engineering/Geoscience Professionals must also confirm that the equipment meets any BC Safety Authority requirements. If the equipment requires services such as electrical, gas, or water feeds, Engineering/Geoscience Professionals are responsible for carrying out Field Reviews of these services.

3.9 HOW SHOULD ISSUES FOUND IN FIELD REVIEWS BE ADDRESSED

- 3.9.1 When work is observed that does not substantially comply in all material respects with the engineering or geoscience concept or intent, as reflected in the documents that have been prepared to guide the implementation or construction, the problem must be communicated in writing to the party responsible for the implementation or construction. The written instructions should clearly indicate which work is nonconforming and why. The means and methods for how to rectify any nonconforming work must remain the responsibility of the contractor or others.
- The Engineering/Geoscience Professional must confirm and record when the work is made to conform to the engineering or geoscience concept or intent, as reflected in the documents that have been prepared to guide the implementation or construction, or what alternative strategy was employed. If the contractor, employer, client, or owner does not make the work conform, the Engineering/Geoscience Professional must consider a written report to the appropriate regulatory authority and must document the events and implications for the contractor, employer, client, or owner.

3.10 WHAT FIELD REVIEW RECORDS MUST BE CREATED AND KEPT

3.10.1 It cannot be over-emphasized how important thorough and complete documentation of Field Review reports and communications can be to Engineering/Geoscience Professionals. Records will refresh memories, confirm directions given, and demonstrate that the required standard of practice has been met in Field Reviews. These Records may also serve as evidence in case of a dispute.

3.10.2 In some instances, the client, owner, or employer may choose to have Field Reviews conducted by someone other than the Professional of Record. In these circumstances, the Professional of Record should develop protocols as described in **Section 3.7 What If the Professional of Record Is Not Engaged for Field Reviews** and retain required Records.

3.10.3 Observations made during Field Reviews must be recorded and retained. Using standard forms that capture the date, time, and detail of any observations helps to ensure consistent and complete Records.

3.10.4 Photographs or videos provide excellent Records of what was observed, and are particularly useful where the work being Field Reviewed will be buried or covered by construction. When using photographs as Records, 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 data, time, location, and photographer;
- setting up appropriate downloading and storage procedures;
- creating a non-editable back-up of all photographs;
- never deleting a photograph in the Record set; and
- enhancing, cropping, or otherwise editing photographs for clarity only, and retaining the original unaltered photo with the edited photo.

3.10.5 Any field notebooks used in Field Reviews to document dates, times, observations, surveys, and actions must be retained as Records.

3.10.6 All communications and directions to the contractor or others implementing the work about observations and nonconforming work must be provided in writing at the time of the Field Review, even if handwritten and followed up later with a typewritten report. Copies must be provided to the owner and retained as a Record. Care must be taken to provide directions about what must be carried out by the contractor or others and to not use language that indicates how to rectify the nonconforming work. Again, using a standard form will help to ensure consistent and complete Records.

3.10.7 The Engineering/Geoscience Professional should continue to report nonconforming work until it is rectified. He or she must confirm and record when the work is rectified as directed.

- 3.10.8 Records of test results must be copied to the contractor, client, or owner and retained as a Record. Calibration results for testing and survey equipment must also be retained as a Record.
- 3.10.9 Site meetings that discuss Field Reviews, observations, and resolutions must be recorded in meeting minutes, distributed to the contractor, owner, and other relevant professionals, and retained as a Record.
- 3.10.10 All Field Review Records must be retained with project or work documentation. For further guidance about retaining project or work documentation, see the Engineers and Geoscientists BC *Quality Management Guidelines – Retention of Project Documentation* (Engineers and Geoscientists BC 2018b).

4.0 REFERENCES AND RELATED DOCUMENTS

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