



GUIDE TO THE STANDARD FOR DOCUMENTED INDEPENDENT REVIEW OF STRUCTURAL DESIGNS

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**ENGINEERS &
GEOSCIENTISTS**
BRITISH COLUMBIA

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PREFACE

This *Guide to the Standard for Documented Independent Review of Structural Design* (the “Guide”) was developed by Engineers and Geoscientists BC to explain the standards of practice, conduct, and competence and enhance the quality of practice related to structural design by expected of Professional Registrants.

This current revision was undertaken to provide clarity in guidance to Professional Registrants in accordance with the scheme and requirements of the *Professional Governance Act* and Engineers and Geoscientists BC’s Bylaws.

This document outlines the appropriate standards of practice, conduct, and competence to be followed at the time it was prepared. However, this is a living document that is to be revised and updated as required in the future, to reflect the developing state of practice.

ABBREVIATIONS

ABBREVIATION	TERM
BC	British Columbia
CWC	Canadian Wood Council
EGBC	Engineers and Geoscientists BC
Struct.Eng.	Designated Structural Engineer

DEFINITIONS

The following definitions are specific to this Guide. These words and terms are capitalized throughout the document.

TERM	DEFINITION
Act	The <i>Professional Governance Act</i> , S.B.C. 2018, c. 47.
Bylaws	The Bylaws of Engineers and Geoscientists BC made under the <i>Act</i> .
Document(s)	Includes any physical or electronic Record, including but not limited to a report, certificate, memo, specification, drawing, map, or plan, that conveys a design, direction, estimate, calculation, opinion, interpretation, observation, model, or simulation that relates to the Regulated Practice.
Documentation	See the definition for “Record”.
Engineers and Geoscientists BC	The Association of Professional Engineers and Geoscientists of the Province of British Columbia, also operating as Engineers and Geoscientists BC.
Firm	As defined in the <i>Act</i> : “(a) a legal entity or combination of legal entities engaged in providing services in respect of a Regulated Practice, or (b) a ministry or agency of the government that the Lieutenant Governor in Council may prescribe by regulation, but does not include a legal entity or combination of legal entities that may be exempted from this <i>Act</i> by regulation of the Lieutenant Governor in Council.”
Guide	A guide to a program or regulatory topic, published by Engineers and Geoscientists BC. These include Guides to quality management standards that in accordance with the <i>Act</i> and Bylaws define professional obligations related to specific processes and explain the minimum standards of practice, conduct, and competence expected from Professional Registrants and Firms.

TERM	DEFINITION
Independent Review	<p>A documented evaluation of the structural design concept, details, and Documentation based on a qualitative examination of the substantially complete structural design Documents before they are issued for construction or implementation, and the evaluation is performed in accordance with the Bylaws and this Guide by an appropriately qualified and experienced Professional Registrant who was not involved in preparing the design.</p> <p>There are two types of Independent Review:</p> <ul style="list-style-type: none"> • Type 1 Independent Review is an Independent Review carried out by an appropriately qualified and experienced Professional Registrant who was not involved in preparing the design but may be employed at the same Firm as the Professional of Record who is responsible for the design. • Type 2 Independent Review is an Independent Review carried out by an appropriately qualified and experienced Professional Registrant who was not involved in preparing the design and is not employed at the same Firm as the Professional of Record who is responsible for the design.
Independent Reviewer	The Professional Registrant who is responsible for conducting and completing an Independent Review.
Professional of Record	The Professional Registrant who is professionally responsible for activities, work, or Documents related to the Regulated Practice.
Professional Registrant	<p>A registrant of Engineers and Geoscientists BC who is registered in one of the following categories of registrants:</p> <ol style="list-style-type: none"> professional engineer; professional geoscientist; professional licensee engineering; professional licensee geoscience; life member prior to 1998; honorary life member.
Record (Documentation)	Any Document that is evidence of Regulated Practice activities, events, or transactions, or is evidence that a Professional Registrant has met their professional and contractual obligations.
Regulated Practice	As defined in the <i>Act</i> and the <i>Regulation</i> , the carrying on of a profession by a registrant of a regulatory body, which for the purposes of this Guide means the practice of professional engineering or the practice of professional geoscience.
Regulation	The <i>Engineers and Geoscientists Regulation</i> , OIC 2021/037.
Structure	A series of connected, interrelated elements that form a system that provides adequate rigidity and can resist a series of external load effects applied to it, including its own weight. Structures can be temporary or permanent, and include buildings, retaining walls, large signage, support towers, bridges, dams, and tunnels.

VERSION HISTORY

VERSION NUMBER	PUBLISHED DATE	DESCRIPTION OF CHANGES
2.0	February 17, 2021	Updated the content and terminology to conform with the <i>Professional Governance Act</i> and updated Bylaws; changed the main title to “Guide to the Standard for Documented Independent Review of Structural Designs”; changed the document category from “quality management guidelines” to “quality management guides.”
1.4	January 9, 2018	Updated the format to align with new Engineers and Geoscientists BC brand; minor editorial corrections.
1.3	March 31, 2016	Minor editorial corrections
1.2	October 7, 2013	Minor editorial corrections.
1.1	February 25, 2013	Minor editorial corrections.
1.0	May 2012	Initial version.

1.0 INTRODUCTION

1.1 OVERVIEW

- 1.1.1 Engineers and Geoscientists BC is the regulatory and licensing body for the engineering and geoscience professions in British Columbia (BC). To protect the public, Engineers and Geoscientists BC establishes, monitors, and enforces standards for the qualifications and practice of Professional Registrants.
- 1.1.2 Engineers and Geoscientists BC provides practice resources to Professional Registrants to assist them in meeting their professional and ethical obligations under the *Act* and Bylaws. One category of these practice resources is Guides to quality management standards, which explain the standards of practice, conduct, and competence for quality management in professional activities.
- 1.1.3 This *Guide to the Standard for Documented Independent Review of Structural Designs* explains the standard of practice, conduct, and competence for Professional Registrants related to Independent Reviews of the designs of Structures. This Guide explains how Professional Registrants should uphold their professional obligations while involved in the design of Structures or conducting Independent Reviews of the design of Structures.
- 1.1.4 This current revision was undertaken to provide clarity in guidance to Professional Registrants, in accordance with the scheme and requirements of the *Act* and

the current Bylaws, and to assist Professional Registrants in upholding their professional obligations under the *Act* and Bylaws.

1.2 PURPOSE OF THIS GUIDE

- 1.2.1 This document explains the standards of practice, conduct and competence expected of Professional Registrants engaged in the design of Structures or engaged in Independent Reviews of the design of Structures. This Guide provides a common approach applicable to all Professional Registrants who engage in the design of Structures or Independent Reviews of the design of Structures as part of their professional activities.
- 1.2.2 Specifically, this Guide sets out the expectations for professional practice that Professional Registrants must follow and meet when their practices involve the design of Structures or the Independent Review of the design of Structures.
- 1.2.3 The specific objectives of this Guide are to:
 - 1. describe the minimum standards for an Independent Review;
 - 2. assist Professional Registrants in establishing and maintaining documented quality management processes and procedures for commencing, conducting, and retaining Records of Independent Reviews;

3. describe the qualities and processes necessary to ensure that Independent Reviews are useful, reliable, and protect the safety of the public and the environment;
4. explain the difference between checking and an Independent Review;
5. provide guidance on the qualifications required for Professional Registrants who are conducting Independent Reviews;
6. provide guidance on how Professional Registrants should identify and address issues during the course of Independent Reviews; and
7. provide guidance on how to meet the quality management requirements under the Act and Bylaws when engaged in designing or reviewing the design of Structures.

1.3 ROLE OF ENGINEERS AND GEOSCIENTISTS BC

- 1.3.1 This Guide and the current revision was developed under the direction of Engineers and Geoscientists BC's Council and, prior to publication, underwent final legal and editorial reviews. This Guide forms part of Engineers and Geoscientists BC's continuing commitment to establishing and monitoring the quality of professional services that Professional Registrants provide to their clients and to the public.

- 1.3.2 The timely and proper completion of Independent Reviews are a critical requirement for assisting Professional Registrants in fulfilling their professional obligations, including holding paramount the safety, health, and welfare of the public. The type of Independent Reviews varies, depending on the nature of and risk posed by the design for a specific Structure. This Guide explains the requirements for professional practice in broad terms but is the minimum standard of practice expected of Professional Registrants.

1.4 SCOPE

- 1.4.1 Proper and appropriate Independent Reviews of structural designs are fundamental to upholding the *Act* and Bylaws, including the Code of Ethics in Schedule A of the Bylaws, which require that all Professional Registrants hold paramount the safety, health, and welfare of the public, including the protection of the environment and the promotion of health and safety within the workplace.
- 1.4.2 Professional Registrants carrying out the design of Structures must meet the requirement of section 7.3.5 of the Bylaws by having Independent Reviews of any structural designs they prepare carried out by another appropriately qualified and experienced Professional Registrant before the Documents are issued for construction or implementation. Section 7.3.5 of the Bylaws is the standard of professional and ethical conduct for Professional Registrants engaged in this area of Regulated Practice.

1.4.3 This Guide is intended to assist Professional Registrants in establishing and maintaining a documented quality management procedure for Independent Reviews that complies with the requirements of the *Act* and of the Bylaws by addressing :

- the process of an Independent Review;
- the purpose of an Independent Review;
- the required extent of an Independent Review;
- what should be Independently Reviewed;
- when an Independent Review should occur;
- what an Independent Review includes;
- how checking differs from Independent Review;
- the Documents required for an Independent Review;
- responsibility for ensuring an Independent Review occurs;
- qualifications required to carry out an Independent Review;
- how to identify and address issues in the course of an Independent Review; and
- ensuring that Records of an Independent Review are appropriately prepared and retained.

1.4.4 To comply with the Bylaws, Professional Registrants must have established, or have access through their Firm to, documented quality management procedures that include having designs of Structures independently reviewed by another qualified Professional Registrant before the design Documents are issued for construction or implementation.

1.4.5 A documented quality management procedure is one that has been thought out and reduced to writing in a suitable form. The process may be captured in a written procedure, process flowchart, checklists, forms to record Independent Reviews, or other Documentation developed to suit the nature of the work undertaken by Professional Registrants.

1.4.6 These obligations apply to Professional Registrants acting in their professional capacities in all industries where the design of Structures is being carried out, and when their work involves, among other things:

- ongoing professional engineering or professional geoscience work;
- projects with a defined start and finish;
- products and services requiring the design of a Structure;
- permanent or temporary Structures, including those related to construction;
- independently supported Structures designed or constructed in BC, including retaining walls, large signage, support towers, bridges, dams, and tunnels;
- Structures, including cranes, designed for use as part of a facility, vehicle, vessel, mode of transportation, or mobile equipment;
- construction being carried out by a Professional Registrant or the Firm of the Professional Registrant;
- construction carried out by others;
- design of a Structure carried out for use internally by a Professional Registrant's Firm; and
- design of a Structure carried out for others.

- 1.4.7 Terminology used within an industry may not match the terminology used in this Guide. However, the obligations of Professional Registrants in all industries remain the same: to ensure that any design of a Structure not specifically exempted receives an Independent Review that meets the intent of the *Act*, Bylaws and this Guide.
- 1.4.8 A Structure is defined in the Bylaws, at section 1.1(1), as:
- “a series of connected, interrelated elements that form a system that provides adequate rigidity and can resist a series of external load effects applied to it, including its own weight. Examples include temporary or permanent structures such as buildings, retaining walls, large signage, support towers, bridges, dams, and tunnels.”
- 1.4.9 Engineers and Geoscientists BC considers vehicles, vessels, modes of transportation, and mobile equipment to be distinct from Structures. For example, even though the design of a multi-deck ship involves principles and techniques of structural engineering, Engineers and Geoscientists BC would not consider such a design to fall under the requirements of this Guide. Such designs would fall under the requirements of section 7.3.6 of the Bylaws.
- 1.4.10 However, Professional Registrants should be aware that such designs may include Structures that require Independent Review. For example, Engineers and Geoscientists BC considers the design of cranes, whether fixed, mobile, or mounted to a vehicle or vessel, to be structural design requiring an Independent Review.
- 1.4.11 This Guide must be read in conjunction with the other requirements of the Bylaws, and the Engineers and Geoscientists BC *Guide to the Standard for Documented Checks of Engineering and Geoscience Work* (Engineers and Geoscientists BC 2021a).

2.0 REGULATORY FRAMEWORK

- 2.1 Section 57(1) of the *Act*, Standards of conduct and competence, states that:
- “Subject to subsections (2) and (3), the council of each regulatory body must make bylaws establishing the following:
- (a) standards of professional and ethical conduct for registrants, which standards may be different for different categories or subcategories of registrants;
 - (b) standards of competence for registrants, which standards may be different for different categories or subcategories of registrants or different areas of practices;”
- ...
- 2.2 Section 7.3.5 of the Bylaws, Standard for Independent Review(s) of Structural Designs, states that:
- “(1) All Structural Designs require documented independent review(s) prior to Documents being issued for construction or implementation.
- (2) Despite subsection (1), EGBC may identify classes of Structures that do not require documented independent review(s) of Structural Designs.
- (3) A Professional of Record must
- (a) complete a documented risk-assessment after conceptual design and before detailed design of a Structural Design to determine the following:
 - (i) the appropriate frequency for the required documented independent review(s) of the Structural Design;
 - (ii) whether the required documented independent review(s) of the Structural Design must be conducted by
 - (A) an appropriately qualified and experienced Professional Registrant who has not been previously involved in the Structural Design and is employed by the same Firm employing the Professional of Record, or
 - (B) an appropriately qualified and experienced Professional Registrant who has not been previously involved in the Structural Design and is employed by a Firm other than the Firm employing the Professional of Record.
 - (b) record their rationale for the determinations made pursuant to paragraphs (a)(i) and (ii),
 - (c) document actions taken or not taken, along with the rationale for that decision, as a result of the independent review(s), including any actions taken or not taken as a result of information received pursuant to subsection (7)(d),

- (d) communicate the actions and rationale documented pursuant to paragraph (c) to the Professional Registrant tasked with completing the documented independent review in an appropriately timely manner.
- (4) Despite subsection (3)(b), EGBC may identify classes of Structures for which required documented independent reviews must be conducted by an appropriately experienced Professional Registrant who has not been previously involved in the Structural Design and is employed by a Firm other than the Firm employing the Professional of Record.
- (5) Documented independent review(s) of Structural Designs must not replace the regular, documented checks required pursuant to section 7.3.4 of the Bylaws.
- (6) If applicable pursuant to subsection (1) and not exempted pursuant to subsection (2), a Professional Registrant must establish, maintain, and follow documented procedures for documented independent review(s) of Structural Designs.
- (7) A Professional Registrant tasked with completing a documented independent review of a Structural Design must
 - (a) have appropriate experience in the type and scale of the Structural Design subject to the documented independent review,
 - (b) determine the extent of the documented independent review based on the progressive findings of the documented independent review and record the rationale for this determination,
 - (c) evaluate any related Documents to determine if they are complete, consistent, and in general compliance with applicable codes, standards, and other requirements,
 - (d) communicate any issues found during the independent review(s) to the Professional of Record in an appropriately timely manner,
 - (e) complete a documented record of the documented independent review that meets the intent of the documented independent review sign off form issued by EGBC, and
 - (i) provide this documented record to
 - (A) the Professional of Record, and
 - (B) the authority having jurisdiction, if requested, and
 - (ii) retain and preserve this documented record for a period of 10 years in accordance with section 7.3.2(3),
 - (f) examine representative samples of the structural assumptions, continuity of gravity and lateral load paths, stability, and detailing, and
 - (g) perform numerical calculations on a sample of gravity and lateral force resisting elements necessary to satisfy any concerns of the Professional Registrant tasked with completing the documented independent review, as appropriate.

- (8) While a documented risk assessment and a documented independent review of each instance of repetitive designs of individual structural components is not required,
- (a) the maintenance of design quality must be confirmed through
 - (i) an initial documented initial risk assessment and documented independent review, and
 - (ii) documented risk assessments and documented independent reviews at intervals,
 - (b) a documented process must be in place that identifies the criteria used to determine what types of designs are considered repetitive and the interval frequency for maintaining the design quality, and
 - (c) the documented record produced through
 - (i) the initial documented risk assessment and documented independent review, and
 - (ii) documented risk assessments and documented independent reviews at intervals
- must be retained and preserved for a minimum of 10 years after the last use of the repetitive design and made available to any person using the Structural Design, in accordance with section 7.3.2(3).”

2.3 This Guide is intended to assist Professional Registrants in understanding the minimum standard of practice and in fulfilling their professional obligations in accordance with section 7.3.5 of the Bylaws. Failure to meet the requirements as set out in this Guide could be evidence of incompetence, negligence, unprofessional conduct, or breach of the Bylaws, and may lead to disciplinary proceedings by Engineers and Geoscientists BC.

3.0 STANDARDS FOR PRACTICE

3.1 WHAT IS INDEPENDENT REVIEW OF STRUCTURAL DESIGN

- 3.1.1 An Independent Review is a documented evaluation—conducted by an experienced Professional Registrant who has not been involved in preparing the design—of the structural design concept, details, and Documentation based on a qualitative examination of the substantially complete structural design Documents before the Documents are issued for construction or implementation. Engineers and Geoscientists BC previously referred to Independent Review as "concept review."
- 3.1.2 Independent Reviews are not the same as checks of engineering and geoscience work. For information about checking, refer to the Engineers and Geoscientists BC *Guide to the Standard for Documented Checks of Engineering and Geoscience Work* (Engineers and Geoscientists BC 2021a).

3.2 WHAT IS THE PURPOSE OF INDEPENDENT REVIEW OF STRUCTURAL DESIGN

- 3.2.1 Professional Registrants who undertake the design of a Structure have a professional obligation to complete their work in a manner that minimizes risk to the public and the environment. Section 7.3.5 of the Bylaws reflects recognition of the fact that virtually all Structures present risk to the public. As a result, an Independent

Review of any design of a Structure is required. The Independent Review process is intended to produce a professional assessment of the adequacy of the design approach, its execution, and the Documentation. It evaluates the associated Documents to determine whether the structural systems appear complete, consistent, and in general compliance with relevant code and design requirements. The Independent Review may be part of, but is not intended to replace, the regular checks of Regulated Practice required by the Bylaws.

3.3 WHAT EXTENT OF INDEPENDENT REVIEW IS REQUIRED

- 3.3.1 Section 7.3.5(3) of the Bylaws provides that after completing the conceptual design of a Structure but before commencing the detailed design, a Professional of Record must complete a documented risk assessment that determines the appropriate level of review and the appropriate frequency of documented Independent Reviews to be conducted.
- 3.3.2 A documented risk assessment must be completed in order to determine whether a Type 1 or Type 2 Independent Review is required, and the risk assessment must consider:
- consequences of failure;
 - complexity of the structural design;
 - modes of failure;
 - nature of the design assumptions;

- uniqueness of the structural design;
- structural designs of specific types of Structures that have been designated by Engineers and Geoscientists BC or an authority having jurisdiction as requiring a certain type of independent structural review; and
- whether a substantially similar structural design by the same Professional of Record was subject to a Type 2 Independent Review in the reasonably proximate past.

Professionals of Record for primary structural systems must document the considerations addressed, and how they support the level of Independent Review that they have recommended.

3.3.3 The key question in determining the appropriate type of Independent Review is whether the potential risks identified by the risk assessment are significant enough that a Type 2 Independent Review should be conducted. Where the risk assessment does not require a Type 2 Independent Review, a Type 1 Independent Review must still be conducted. All Professional Registrants and Firms involved in the design of Structures must establish documented procedures for conducting these risk assessments and retain the Documents generated from these risk assessments.

- **Type 1 Independent Review** is generally appropriate where the Professional of Record and Firm have experience with the type and scale of the Structure, there are no irregular or uncommon aspects of the structural design, and the structural design only involves design problems with well-defined solutions.

- **Type 2 Independent Review** is generally appropriate where the Professional of Record and Firm do not have experience with the type and scale of the Structure, there are irregular or uncommon aspects of the structural design, or the structural design involves design problems without well-defined solutions.

3.3.4 Regardless of whether the Independent Reviewer is employed by the same Firm as the Professional of Record or by a separate Firm, the Independent Reviewer must not have been previously involved in the design of the Structure that is the subject of the Independent Review.

3.3.5 The extent and level of detail examined in an Independent Review will vary depending on the experience of the Independent Reviewer and the complexity and risk associated with the project. The following questions should be considered when determining the necessary scope of the Independent Review:

- What are the consequences of errors or incompleteness in the engineering work?
- How complex is the design and the product of the design?
- Is the engineering innovative or does it incorporate departures from the previous practice?

3.3.6 Independent Reviewers must be satisfied that they have examined designs in sufficient detail to make informed judgments as to the adequacy of designs for their intended purposes. Independent Reviewers are required to re-evaluate and extend reviews when their evaluations suggest there might be problems with a design.

3.4 WHAT SHOULD BE INDEPENDENTLY REVIEWED

3.4.1 GENERAL

3.4.1.1 If a design is prepared in BC or is for a Structure to be built or erected in BC, it must undergo an Independent Review that is compliant with the Bylaws before Documents are issued for construction or implementation. For clarity, Engineers and Geoscientists BC has identified certain conventional designs for one- or two-family homes that fall under the prescriptive requirements of Part 9 of the *BC Building Code*, the Vancouver Building By-law, or the *National Building Code of Canada* as classes of Structures whose designs do not require Independent Review prior to Documents being issued for construction.

3.4.2 STRUCTURES NOT REQUIRING INDEPENDENT REVIEW

3.4.2.1 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 By-law, or the *National Building Code of Canada* and do not require a structural design to Part 4. Where the structural design of a one- or two-family dwelling is based on Part 9, and includes a design for lateral resistance, which conforms to the prescriptive requirements in the latest edition of 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 a structural design conforming to Part 4 is required, an Independent Review is required.

3.4.2.2 Professional Registrants designing Part 9 residential Structures should follow the Engineers and Geoscientists BC *Guidelines for Professional Structural Engineering Services for Part 9 Buildings in British Columbia* (Engineers and Geoscientists BC 2014) and this Guide. A documented check of all engineering work, including Part 9 buildings, is required. Refer to Engineers and Geoscientists BC *Guide to the Standard for Documented Checks of Engineering and Geoscience Work* (Engineers and Geoscientists BC 2021a).

3.4.3 STRUCTURES REQUIRING PERIODIC INDEPENDENT REVIEW

3.4.3.1 Repetitive Design

The Bylaw exempts “each instance of repetitive designs of individual structural components” from Independent Review. However, to confirm the maintenance of design quality, the Bylaw requires an “initial” Documented Independent Review of a typical component design with Independent Reviews at “intervals.”

3.4.3.2 For repetitive designs, a Professional Registrant or Firm must create a documented process to identify what constitutes a repetitive design, as well as the intervals at which Documented risk assessments and Documented Independent Reviews of the repetitive design will be conducted. The Professional Registrant or Firm must retain the Documents describing this process and the Documents for each risk assessment and Independent Review.

3.4.3.3 Manufactured Structural Components

Many projects incorporate structural components that are designed by Professional Registrants retained by the component manufacturer or contractor (e.g., open web steel joists, pre-cast

concrete beams, wood trusses). Periodic Independent Reviews of these structural component designs are required. The Professional of Record for the primary structural system for a Structure is not responsible for ensuring Independent Reviews are carried out on all individual structural components designed by others and incorporated into the primary structural system. However, the Professional of Record for the primary structural system for a Structure is responsible for confirming that the components are in general conformance with the design concept and general arrangement of the primary structural system.

3.5 WHEN SHOULD INDEPENDENT REVIEW OF STRUCTURAL DESIGN OCCUR

3.5.1 To avoid surprises and unnecessary rework, Independent Reviews may be performed in stages as portions of a design are completed. The initial risk assessment after the completion of the conceptual design should determine the appropriate frequency for these staged reviews. The Professional of Record should consider scheduling the Independent Review of the concept and approach before starting the detailed design, to minimize possible rework. However, the final Independent Review must be completed after checking and before Documents are issued for construction or implementation. Construction must not proceed on any portion of the Structure until an Independent Review of that portion has been completed.

3.6 WHAT DO INDEPENDENT REVIEWS OF STRUCTURAL DESIGN INCLUDE

- 3.6.1 The steps for Independent Review of a structural design include but are not limited to the following:
1. Determine the extent of Independent Review required and record the rationale for this determination.
 2. Review the design criteria, loads (including loads imposed by components designed by other disciplines and loads from adjacent Structures), and performance requirements.
 3. Review geotechnical requirements and material properties.
 4. Review the concept and integrity of the gravity and lateral load resisting system.
 5. Examine representative samples of the structural assumptions, continuity of load paths for both gravity and lateral loads, stability, and detailing.
 6. 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.
 7. Evaluate Documents related to the design of the Structure to ensure they are complete, consistent, coordinated, and in general compliance with the appropriate codes, standards, and other requirements.
 8. Perform calculations on a representative sample of structural elements to determine whether the analysis, design, and detailing

- generally comply with the appropriate codes and standards.
9. Discuss any concerns with the Professional of Record. It is the responsibility of the Professional of Record to adequately resolve concerns noted in the Independent Review.
 10. Provide a formal Record of the Independent Review to the Professional of Record highlighting any concerns (see [Appendix A: Checklist and Signoff for an Independent Review of Structural Designs](#)). If significant concerns are noted, the Professional of Record must revise the structural design and resubmit the revised structural design for an Independent Review, preferably by the same Independent Reviewer. The Independent Reviewer must also provide this Record to the authority having jurisdiction upon request.
 11. Retain this documented Record of the Independent Review for a minimum of 10 years.

3.7 HOW DOES CHECKING COMPARE WITH AN INDEPENDENT REVIEW

- 3.7.1 Structural design checks do not generally satisfy the requirements of an Independent Review. A design check identifies deficiencies but may be limited to evaluations of individual components by different individuals, some of whom may have been involved in the detailed design of other portions of the project. Conversely, an Independent Review does not satisfy the requirements of a structural design check as it does not include detailed evaluation of all components.

- 3.7.2 While checking and Independent Reviews are distinct activities, if Professional Registrants are suitably experienced and independent, they could complete both the design check and the Independent Review.
- 3.7.3 The extent of numerical checking and level of detail examined in an Independent Review will vary depending on the experience of the Independent Reviewer, the complexity and risk associated with a given Structure, and the extent of concerns that develop as the Independent Review proceeds.

3.8 WHAT DOCUMENTS ARE REQUIRED FOR AN INDEPENDENT REVIEW

- 3.8.1 Independent Reviews may occur in stages as portions of the design are completed. However, the final Independent Review should be based on the substantially complete Documents that are to be issued for construction or implementation.
- 3.8.2 Documents that the Professional of Record must provide to the Independent Reviewer include:
 - structural plans and supporting Documents, plus plans and supporting Documents of other disciplines that may be necessary to review the structural design, or that the Independent Reviewer requests;
 - structural specifications, plus specifications of other disciplines that may be necessary to review the Structure, or that the Independent Reviewer requests;

- if 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-specific design data such as seismic parameters, soil-bearing capacity, lateral soil pressure, and pile capacity,
 - design assumptions and the relevant codes and standards referenced in the design,
 - 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 Independent Reviewer; and
- all geotechnical reports and any follow-up Documentation between the Professional of Record and the geotechnical engineer.

3.9 WHO IS RESPONSIBLE FOR ENSURING THAT AN INDEPENDENT REVIEW OCCURS

- 3.9.1 Professionals of Record must ensure that Independent Reviews of designs of Structures have been completed before final Documents are issued for construction or implementation. The Independent Reviewer's responsibility is limited to completing the Independent Review in accordance with this Guide. Independent Reviews of structural designs do not relieve Professionals of Record of their professional responsibilities for structural designs.

3.10 WHO IS QUALIFIED TO CARRY OUT AN INDEPENDENT REVIEW OF A STRUCTURAL DESIGN

- 3.10.1 The Independent Reviewer must be a Professional Registrant with appropriate qualification and experience involving the type of Structure being reviewed. The level of experience required for a specific Structure will depend on the risk and complexity of the Structure. The Independent Reviewer's experience must be sufficient to critique concepts and identify deficiencies in Structures with complexity equal to or greater than the Structure being reviewed. Experienced Professional Registrants in the commercial building sector suggest that a minimum of six years of experience with a particular structural system would be appropriate to act as an Independent Reviewer for most projects in that field.

- 3.10.2 It is the responsibility of the Professional of Record to identify an appropriate Independent Reviewer based on the risk assessment carried out upon completion of the conceptual design.
- 3.10.3 The Independent Reviewer must be suitably experienced but is not required to be registered as a Struct.Eng.
- 3.10.4 The requirement for independence is intended to provide an unbiased review that critically evaluates the design concept and approach selected by the Professional of Record.
- 3.10.5 To maintain independence, the Independent Reviewer must not have been involved in preparing the structural design. The Independent Reviewer may, however, be a member of the same Firm if a documented risk assessment determines that a Type 1 Independent Review is appropriate.
- 3.10.6 Although checking and Independent Reviews are distinct processes, if an individual is suitably experienced and independent, the two processes can be completed by the same individual.

3.11 HOW SHOULD ISSUES IDENTIFIED IN AN INDEPENDENT REVIEW BE ADDRESSED

- 3.11.1 The Independent Reviewer is required to communicate in writing to the Professional of Record the issues found during the Independent Review. The Professional of Record is required to document which actions were taken or not taken as a result of the Independent Review and the rationale for the decisions.

3.12 WHAT RECORDS OF AN INDEPENDENT REVIEW SHOULD BE CREATED AND RETAINED

- 3.12.1 The Independent Reviewer must document the results of the Independent Review and confirm that the results have been conveyed to the Professional of Record. The Independent Reviewer must retain calculations, check prints, and Records of communications concerning the Independent Review. Refer to [Appendix A: Checklist and Signoff for an Independent Review of Structural Designs](#) for an example of a suitable Record and signoff.
- 3.12.2 Professionals of Record or their Firms are required to retain the documented risk assessment that determined the appropriate frequency of the Independent Review and whether the Independent Review should have been a Type 1 or a Type 2 Independent Review. Professionals of Record are also required to keep Records of the actions taken or not taken as a result of Independent Reviews.
- 3.12.3 All Records of Independent Reviews must be retained appropriately. For further guidance about retaining project Documentation, see the Engineers and Geoscientists BC *Guide to the Standard for Retention of Project Documentation* (Engineers and Geoscientists BC 2021b).

4.0 REFERENCES AND RELATED DOCUMENTS

Engineers and Geoscientists Regulation, OIC 2021/037.

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Canadian Wood Council (CWC). 2014. Engineering Guide for Wood Frame Construction. 2014 Edition. Ottawa, ON, Canada: CWC.

City of Vancouver. 2019. City of Vancouver Building By-law 2019. Vancouver, BC: City of Vancouver. [accessed: 2020 Sep 28]. <http://www.bccodes.ca/>.

Engineers and Geoscientists BC. 2021a. Quality Management Guides – Guide to the Standard for Documented Checks of Engineering and Geoscience Work. Version 2.0. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2021 Feb 17]. <https://www.egbc.ca/Practice-Resources/Individual-Practice/Quality-Management-Standards>.

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Engineers and Geoscientists BC. 2014. Guidelines for Professional Structural Engineering Services for Part 9 Buildings in British Columbia. Version 3.0. Burnaby, BC: Engineers and Geoscientists BC. [accessed: 2020 Sep 28].

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

5.0 APPENDIX

Appendix A: Checklist and Signoff for an Independent Review of Structural Designs..... [A-1](#)

APPENDIX A: CHECKLIST AND SIGNOFF FOR AN INDEPENDENT REVIEW OF STRUCTURAL DESIGNS

QUALITY MANAGEMENT GUIDES
GUIDE TO THE STANDARD FOR DOCUMENTED INDEPENDENT REVIEW OF STRUCTURAL DESIGNS

CHECKLIST AND SIGNOFF FOR AN INDEPENDENT REVIEW OF STRUCTURAL DESIGNS

[Print clearly and legibly]

RE:

Name of project or work

Address of project or work

PROFESSIONAL OF RECORD

P.Eng. or P.L.Eng. name

Firm name

Permit to Practice number

Address of firm

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 P.L.Eng. name

Firm name

Permit to Practice number

Address of firm

Date: (yy/mm/dd)

Signature

CHECKLIST AND SIGNOFF FOR AN INDEPENDENT REVIEW OF STRUCTURAL DESIGNS

[Print clearly and legibly]

TO: PROFESSIONAL OF RECORD

DATE: _____

P.Eng. or P.L.Eng. name

Firm name

Permit to Practice number

Address

RE: _____
Project name

Address 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 am a member of the firm _____
(Name of firm)

With the Permit to Practice number: _____
(Permit to Practice number)

and I sign this letter on behalf of the firm.

I certify that I am a Professional Registrant as defined below.

DATE: _____

Name

Signed

Address

Telephone

(Affix PROFESSIONAL SEAL here)

NOTE:

1. The above letter must be signed by a Professional Registrant (professional engineer, and professional licensee engineering, 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.

