



# COMPETENCY ASSESSMENT

COMPETENCY CATEGORY	COMPETENCIES (11)	STRUCTURAL INDICATORS (guidance on example content that will demonstrate the competency)
<b>1. Technical Competence (10 competencies)</b>	1.1 Demonstrate knowledge of regulations, codes, standards, and safety - this includes local engineering procedures and practices as applicable.	<ol style="list-style-type: none"> <li>1. Identify and comply with legal and regulatory requirements for project activities</li> <li>2. Prepare Permit Applications</li> <li>3. Incorporate knowledge of codes and regulations in design materials</li> <li>4. Prepare reports on standards and project compliance</li> <li>5. Recognize the need to design for code compliance while achieving constructability</li> <li>6. Experience with use of applicable Canadian codes and standards for design, construction and testing</li> <li>7. Ability to research and apply suitable international codes as needed</li> </ol>
	1.2 Demonstrate knowledge of materials, or operations as appropriate, project and design constraints, design to best fit the purpose or service intended and address inter-disciplinary impacts.	<ul style="list-style-type: none"> <li>• Demonstrate through examples knowledge of:               <ol style="list-style-type: none"> <li>1. Interaction behaviours of structures with different materials</li> <li>2. Properties of various materials (e.g. steel, concrete, pre-stressed concrete, reinforced concrete, wood, masonry)</li> <li>3. Material specifications and selection</li> <li>4. Constraints imposed on the structural system by requirements of other disciplines</li> <li>5. Optimal design, and construction economics</li> </ol> </li> </ul>
	1.3 Analyze technical risks and offer solutions to mitigate the risks.	<ol style="list-style-type: none"> <li>1. Understanding fundamental structural phenomena of how structures are damaged or fail</li> <li>2. Understanding structural phenomena responses for preventing failure (structural stability)</li> <li>3. Understand the various components of the design and how they contribute to the mitigation of risk</li> <li>4. Understand potential effects of Climate Change</li> </ol>

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	1.4 Apply engineering knowledge to design solutions.	<ul style="list-style-type: none"> <li>• Demonstrate through examples:               <ol style="list-style-type: none"> <li>1. Knowledge of loads and climactic data</li> <li>2. Tolerances, concrete placement, reinforcement, embedment, and welded and bolted connections</li> <li>3. Knowledge of overall design of a structure and its response to the loads and demands</li> <li>4. Understanding issues of serviceability and long term maintenance and function</li> <li>5. Selection of structural system, and material to be used for the project</li> <li>6. Ability to design in more than one material</li> <li>7. Ability to analyze, design and detail lateral load resisting systems in the horizontal and vertical plane, including variable stiffness systems, geometric and/or mass irregularities</li> <li>8. Demonstrate design experience (or working knowledge of) the basic elements of a bridge (abutments, piles, piers and pier caps, retaining walls, bridge deck systems)</li> <li>9. Design to account for effects of elastic shortening, creep, shrinkage, relaxation of pre-stressing strands and differential settlement</li> <li>10. Design to account for temperature variations</li> <li>11. Identify and accommodate site-specific logistical issues in design and construction plans</li> <li>12. Demonstrate seismic knowledge using capacity design principles (mandatory for Engineers and Geoscientists BC applicants)</li> </ol> </li> </ul>
	1.5 Be able to understand solution techniques and independently verify the results.	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding of the engineering principles used in the application of computer design programs</li> <li>2. Understand and have the ability to do approximate analysis to independently verify the results of technical software and solution</li> <li>3. Participate in an independent review process</li> </ol>
	1.6 Safety awareness: be aware of safety risks inherent in the design; and Demonstrate Safety Awareness - on-site and possible safety authorization/certificate as appropriate.	<ol style="list-style-type: none"> <li>1. Be aware of safety risks associated with the construction of the structure</li> <li>2. Demonstrate an understanding of safety regulations for construction, presence of adjacent structures, geotechnical considerations, impact to the environment</li> <li>3. Demonstrate specific knowledge of safety regulations</li> <li>4. Understanding of site safety and Workers' Compensation Act</li> <li>5. Knowledge and experience with use of Work-Safe/Workers' Compensation Board regulations for design of fall arrest and fall protection lanyards, lifelines, anchors etc</li> <li>6. Incorporate explicit human and public safety considerations in design and all other professional activities</li> </ol>
	1.7 Demonstrate understanding of systems as well as of components of systems.	<ol style="list-style-type: none"> <li>1. Demonstrate an understanding of the interactions and constraints in the behaviour of the overall system</li> <li>2. Understand the role and responsibility of a specialty structural engineer</li> <li>3. Understand the integration of components to generate load paths</li> </ol>

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	<p>1.8 Exposure to all stages of the process/project life cycle from concept and feasibility analysis through implementation.</p>	<p>1. Demonstrate awareness of project concerns and roles of other stakeholders in the project stages:</p> <ul style="list-style-type: none"> <li>◦ <b>Identification:</b> generation of the initial project idea and preliminary design</li> <li>◦ <b>Preparation:</b> detailed design of the project addressing technical and operational aspects</li> <li>◦ <b>Appraisal:</b> analysis of the project from technical, financial, economic, social, institutional and environmental perspectives</li> <li>◦ <b>Preparation of specifications and tender documents:</b> preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work</li> <li>◦ <b>Implementation and monitoring:</b> implementation of project activities, with on-going checks on progress and feedback</li> <li>◦ <b>Evaluation:</b> periodic review of project with feedback for next project cycle</li> </ul>
	<p>1.9 Understand the concept of quality control during design and construction including independent design check and independent reviews of design, field checks and reviews.</p>	<ol style="list-style-type: none"> <li>1. Demonstrate Quality Control in the production of structural drawings &amp; engineering calculations and reports, including review by the supervising professional</li> <li>2. Participate in independent structural concept review by a third party professional engineer</li> <li>3. Conduct site visits to observe and verify construction process as well to write field reviews for as built structural conformance to construction drawings</li> <li>4. Review shop drawings for compliance with design</li> <li>5. Participate in field review and demonstrate an understanding of roles of testing agencies in the field inspection process. Respond appropriately to site changes or work that is not compliant</li> <li>6. Operate in an ISO9001-certified environment</li> </ol>
	<p>1.10 Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.</p>	<ol style="list-style-type: none"> <li>1. Supervise the drafting of his/her design and produce sketches for the drafters/CAD technicians, and demonstrate document coordination and control</li> <li>2. Ensure that drawings reflect the design models and required behaviour</li> <li>3. Produce technical specifications for construction</li> <li>4. Be able to review and analyze designs of others and communicate findings and suggest alternatives</li> </ol>
<p><b>2. Professional Accountability (4 competencies)</b></p>	<p>2.1 Demonstrate awareness of professional accountability.</p>	<ol style="list-style-type: none"> <li>1. Awareness of the potential professional liability involved in all aspects of the design, construction and inspection process.</li> <li>2. Structural applicants only: Understand the role of the StructEng and Independent Peer Reviews of work</li> </ol>