

Guidance on Generic Indicators

COMPETENCY CATEGORY	COMPETENCIES (34)	GENERIC INDICATORS (guidance on example content that will demonstrate the competency)
1. Technical Competence (10 competencies)	1.1 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards. This includes local engineering procedures and practices as applicable.	<ol style="list-style-type: none"> 1. Identify and comply with legal and regulatory requirements for project activities 2. Incorporate knowledge of codes and regulations in design materials 3. Prepare reports assessing project compliance with Canadian codes, standards, and regulations 4. Recognize the need to design for code compliance while achieving constructability 5. Identify Canadian, provincial/territorial, regional, indigenous codes, standards and/or practice guidelines that are applicable to your example. Briefly discuss how the Canadian codes, standards and/or guidelines would be applied in your example if it had taken place in Canada 6. Incorporate knowledge of Canadian, provincial, regional, indigenous codes, standards, regulations and/or practice guidelines in design materials 7. Recognize the important of respecting the regional traditions and indigenous regulations towards a project
	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.	<ol style="list-style-type: none"> 1. Demonstrate knowledge of materials, operations, project and design constraints, e.g. cost, design, material, labour, time, budget, production 2. Demonstrate understanding of and coordination with other engineering and professional disciplines
	1.3 Analyze technical risks and offer solutions to mitigate the risks.	<ol style="list-style-type: none"> 1. Demonstrate familiarity with system protection and/or damage/hazard mitigation objectives, philosophies, practices, procedures, and functions 2. Identify risk areas including causes of risks and their impacts 3. Develop risk management/mitigation plans 4. Demonstrate an understanding of the difference between technical risk and public safety issues
	1.4 Apply engineering knowledge to design solutions.	<ol style="list-style-type: none"> 1. Prepare technical specifications 2. Demonstrate use of theory and calculations to arrive at solutions 3. Demonstrate the development of a unique design solution which could not be accomplished with a standard design solution
	1.5 Be able to understand solution techniques and independently verify the results.	<ol style="list-style-type: none"> 1. Demonstrate an understanding of the engineering principles used in the application of computer design programs and show/describe how the results were verified as correct 2. Participate in an independent review and verification of solution techniques or analysis methods

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	1.6 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards pertaining to safety.	<ol style="list-style-type: none"> 1. Identify, incorporate, and/or participate in review of safety considerations, safety procedures and safety equipment as they apply to system operations and/or maintenance programs in Canada. 2. Review and incorporate safety or system operating procedures within in a Canadian context. 3. Demonstrate specific knowledge of Canadian safety regulations. 4. Incorporate explicit human and public safety considerations in design and all other professional activities. 5. Understand and account for safety risks associated with processes. 6. Identify relevant protection equipment and process modifications to mitigate safety risks.
	1.7 Demonstrate understanding of systems as well as of components of systems.	<ol style="list-style-type: none"> 1. Demonstrate an understanding of each element in a process 2. Demonstrate an understanding of the interactions and constraints in the behaviour of the overall system 3. Manage processes within the overall system (monitor and, where needed, modify processes to achieve optimum outcomes)
	1.8 Exposure to all stages of the process/project life cycle from concept and feasibility analysis through implementation.	<ol style="list-style-type: none"> 1. Demonstrate awareness of project concerns and roles of other stakeholders in the project stages: <ul style="list-style-type: none"> ◦ Identification: generation of the initial project idea and preliminary design ◦ Preparation: detailed design of the project addressing technical and operational aspects ◦ Appraisal: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives ◦ Preparation of specifications and tender documents: preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work ◦ Implementation and monitoring: implementation of project activities, with ongoing checks on progress and feedback ◦ Evaluation: periodic review of project with feedback for next project cycle
	1.9 This competency is intended to demonstrate your understanding of the role of peer review and quality management that is essential to engineering practice in Canada.	<ol style="list-style-type: none"> 1. Conduct checks, including field checks, to verify the validity of design 2. Follow Canadian Quality Management principles in practice, which may include Quality Management Guidelines, Guidelines on Authentication of Documents, Use of the Seal, Reviewing Work Prepared by Others and other related practice guidelines provided by their provincial/territorial regulator. 3. Prepare quality control plans, including frequency and test parameters, for specific processes or products 4. Evaluate test results, determine adequacy, and develop recommended action 5. Demonstrate peer review 6. Demonstrate that completed project, systems or sub-systems meet project objectives in terms of functionality and operational performance

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	1.10 Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.	<ol style="list-style-type: none"> 1. Review designs of others and communicate findings and issues, including suggested alternatives 2. Demonstrate communication of ideas and concepts to project team members 3. Demonstrate understanding of value of project completion reports and lessons learned reports to application in future projects by self or others 4. Produce sketches, notes, documentation and design documents to prepare proposals, preliminary, and final design drawings for acceptance by the client and approval by regulatory authorities
2. Communication (3 competencies)	2.1 This competency is intended to demonstrate your ability to communicate effectively with team members, clients, contractors and members of the public in Canada's official languages (English or French).	<ol style="list-style-type: none"> 1. Communicate in a simple and concise manner in English/French 2. Communicate official project data with team members, clients, contractors 3. Ability to express both technical and non-technical issues and ideas clearly to both technical and non-technical personnel 4. Conduct presentations to technical and non-technical groups; presentations to superiors and subordinates; internal (colleagues) and external (clients) presentations 5. Present project parameters to the public 6. Demonstrate active participation in and contribution to meetings
	2.2 This competency is intended to demonstrate your ability to communicate effectively with team members, clients, contractors and members of the public in Canada's official languages (English or French).	<ol style="list-style-type: none"> 1. Tailor communications to the intended audience 2. Ability to write and review technical documents in English/French 3. Ability to write clear memos and reports to both technical and non-technical personnel 4. Utilize drawings and sketches to demonstrate key points and concepts 5. Demonstrate a written report on a technical subject 6. Demonstrate a written report on field observations 7. Take training in technical report writing 8. Working with common office programs (e.g., Excel, Word, Outlook, internet browsers)
	2.3 This competency is intended to demonstrate your ability to communicate in writing within the Canadian engineering environment	<ol style="list-style-type: none"> 1. The ability to review technical documents, to understand the implications and to summarize key points in English/French
3. Project and Financial Management (5 competencies)	3.1 Awareness of project management principles.	<ol style="list-style-type: none"> 1. Awareness of resource planning, budgeting, change management, scope management, schedule and unforeseen issues in managing a project from start to end 2. Understand the impacts, benefits and risks of various design solutions have on a project 3. Understand the needs and expectations of internal and external clients
	3.2 Demonstrate increasing level of responsibility for project planning and implementation.	<ol style="list-style-type: none"> 1. Follow and contribute to development of project management plans 2. Be aware of future improvements and demands as well as other ongoing projects 3. Demonstrate increasing responsibility for client contact and management 4. Demonstrate how project planning activities and interaction with others has increased over the training period 5. Participate in managing and adapting a schedule 6. Demonstrate awareness of issues related to other disciplines that might affect the project, maintaining contact and communication to discuss and resolve issues

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	3.3 Manage expectations in light of available resources.	<ol style="list-style-type: none"> 1. Update schedule and budget on regular basis and communicate status 2. Provide market assessment and availability of materials for a project 3. Meet deadlines
	3.4 Understand the financial aspects of their work.	<ol style="list-style-type: none"> 1. Demonstrate cognizance of project budget during design and construction 2. Provide technical/financial report and compare the options 3. Demonstrate the understanding of the place of finance in business decisions 4. Understand principles of budgeting and financing 5. Understand the relevant business processes 6. Demonstrate an understanding of working with and developing contracts
	3.5 Ask for and demonstrate response to feedback.	<ol style="list-style-type: none"> 1. Demonstrate implementation of lessons learned, and performance reviewed in meetings 2. Show willingness to accept comments and criticism 3. Identify situations where you received feedback and how you responded to that feedback 4. Demonstrate appreciation of the scope of a project and an appropriate response when a project varies beyond the scope
4. Team Effectiveness (2 competencies)	4.1 Work respectfully and with other disciplines/people.	<ol style="list-style-type: none"> 1. Demonstrate respect for others' responsibility and expertise 2. Integrate engineering with other professional input 3. Participate actively in team discussions
	4.2 Work to resolve differences.	<ol style="list-style-type: none"> 1. Demonstrate leadership in achieving team goals and resolving conflict 2. Work to facilitate beneficial conflict resolution 3. Exposure to training in conflict resolution
5. Professional Accountability (6 competencies)	5.1 This competency is intended to demonstrate your ability to apply principles of the Code of Ethics within the Canadian engineering environment.	<ol style="list-style-type: none"> 1. Comply with the Code of Ethics in your jurisdiction of practice 2. Fulfill professional obligations to employers, clients, peers and the profession while applying professional ethics in meeting corporate directives 3. Understand the concept of self-governance, and the privileges granted to professional engineers and their obligations 4. Work within the engineering and geoscience legislation in the jurisdiction of practice 5. Demonstrate the use of practice guidelines in relation to self-regulation and professional practice
	5.2 Demonstrate an awareness of your own scope of practice and limitations.	<ol style="list-style-type: none"> 1. Ask for help and incorporate input 2. Demonstrate interaction with your supervisor 3. Ask questions when needed
	5.3 Understand how conflict of interest affects your practice.	<ol style="list-style-type: none"> 1. Understand how Conflict of Interest affects your practice
	5.4 Demonstrate awareness of professional accountability.	<ol style="list-style-type: none"> 1. Awareness of the potential professional liability involved in all aspects of the design, construction and inspection process 2. Structural applicants only: Understand the role of the StructEng and Independent Peer Reviews of work

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	5.5 Demonstrate an understanding of appropriate use of the stamp and seal.	1. Please note that understanding and awareness is what is required for this Key Competency
	5.6 Understand own strengths/weaknesses and know how they apply to one's position.	1. Prepare a self criticism list and the ways to mitigate or eliminate weaknesses
6. Social, Economic, Environmental and Sustainability (5 competencies)	6.1 Demonstrate an understanding of the safeguards required to protect the public and the methods of mitigating adverse impacts.	1. Prepare public safety regulations and advice during design and implementation of a project 2. Understand potential effects of Climate Change
	6.2 This competency is intended to demonstrate your understanding of the relationship between the engineering activity and the public.	1. Recognize the value and benefits of the engineering work to the public 2. Prepare a report regarding the impact of a project to public
	6.3 Understand the role of regulatory bodies on the practice of engineering.	1. Recognize the importance of respecting the regional traditions and native regulations towards a project 2. Understand the role and regulations of other professions whose practices overlap or interface with the practice of professional engineering
	6.4 Be aware of any specific sustainability clauses that have been added to practice guidelines that apply to their area.	1. Be aware of any specific sustainability clauses that have been added to practice guidelines that apply to his/her area
	6.5 To the extent possible, recognizing the applicant's position of influence, consider how sustainability principles could be applied and promoted in his/her specific work.	1. Include sustainability analysis in project descriptions 2. Provide a list of revisions made during design and implementation period of the project
7. Personal Continuing Professional Development (3 competencies)	7.1 Demonstrate completion of professional development activities.	1. Participation in Community, Technical, Industry and/or professional association committees and task forces 2. Engagement in a variety of self-directed and formal professional development activities to learn and maintain currency in field of practice and report progress to applicable parties
	7.2 Demonstrate awareness of gaps in knowledge and areas requiring future development.	1. Gap analysis of knowledge and skills; highlight the gaps that exist 2. Identification of areas of weakness where additional training is needed
	7.3 Develop a professional development plan to address gaps in knowledge and maintain currency in field of practice.	1. Plan to pursue training in areas of weakness and remedy gaps in knowledge 2. Planned activities may include a variety of self-directed and formal professional development activities to learn and maintain currency in field of practice

Guidance on Building Enclosure Indicators

COMPETENCY CATEGORY	COMPETENCIES (10)	BUILDING ENCLOSURE INDICATORS (guidance on example content that will demonstrate the competency)
1. Technical Competence (10 competencies)	1.1 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards. This includes local engineering procedures and practices as applicable.	<ol style="list-style-type: none"> 1. Identify and comply with legal and regulatory requirements for project activities. 2. Prepare or review drawings and specifications for permit applications, tender, and construction. 3. Incorporate knowledge of codes, standards and regulations in design documents, particularly Parts 5, 9 and 10 (BC Building Code of the applicable code, those sections associated with condensation control, water penetration control, heat, air and moisture transfer, and Parts 3 and 4 of the applicable code and Vancouver Building Bylaw as they apply to the building enclosure. 4. Recognize the need to design for code compliance while achieving constructability. 5. Use knowledge of applicable codes and standards for construction and testing.
	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.	<p>Demonstrate a thorough understanding of the following areas of theory and technical knowledge as they relate to the performance of the building enclosure and as outlined in the references to the Professional Practice Guidelines for Building Enclosure Engineering Services (BC) or the guideline for the jurisdiction in which you propose to practice:</p> <ol style="list-style-type: none"> 1. Materials Knowledge including physical and chemical properties, mechanisms of deterioration, behaviour and performance thresholds with respect to other materials and environments (Section 3.1.2.1.1 of the referenced guideline) 2. Building Physics including boundary conditions, environmental impact, structural loads, hygrothermal calculations, analysis simulation, consideration and accommodation to prevent problematic accumulation of moisture within the building enclosure (Section 3.1.2.1.2 of the referenced guideline) 3. Components, Assemblies and Other Building Systems including interdependence, integration of theoretical and technical knowledge and assessment of the appropriate of heat, air and moisture control functions with respect to elements that comprise the building enclosure (Section 3.1.2.1.3 of the referenced guideline)

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	1.3 Analyze technical risks and offer solutions to mitigate the risks.	<ol style="list-style-type: none"> 1. Demonstrate the ability to apply informed, professional judgment calls where risk assessment is concerned 2. Identify risks and benefits of alternatives 3. Determine the consequences of selection of alternatives, decisions and actions 4. Determine relative costs of various acceptable alternatives 5. Demonstrate an understanding of implications to risk of the application of local construction practices
	1.4 Apply engineering knowledge to design solutions.	<p>Demonstrate familiarity with the content and preparation of building enclosure related construction documents and apply this knowledge to the design and design review of building enclosures, including:</p> <ol style="list-style-type: none"> 1. assessment of exposure conditions related the building site, determination of appropriate external environmental loads and assessment of internal loads imposed on the building enclosure due to use and occupancy 2. development and determination of appropriate building enclosure assemblies, selection of components and materials for the environmental conditions and compatibility with adjoining materials and consideration of service lives and relative durability of materials and components 3. calculation of heat, air and moisture transfer through elements and assemblies in conformance with good practice 4. confirmation of continuity of primary heat, air and moisture control functional surfaces or barriers throughout the building enclosure 5. review and analysis of designs of others. Communication of findings and suggestion of alternatives.
	1.5 Be able to understand solution techniques and independently verify the results.	<ol style="list-style-type: none"> 1. Demonstrate an understanding of the building science/engineering principles used in the application of computer design programs 2. Understand and have the ability to do approximate analysis to independently verify the results of technical software and solution 3. Participate in an independent review process
	1.6 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards pertaining to safety.	<ol style="list-style-type: none"> 1. Demonstrate awareness of safety risks associated with the evaluation, design and construction of the building enclosure. 2. Demonstrate knowledge of site safety and worker compensation act. 3. Demonstrate knowledge and experience of regulations for design and use of fall arrest and fall protection systems 4. Incorporate explicit human and public safety considerations in design and all other professional activities 5. Demonstrate knowledge of how safety considerations affect design decisions
	1.7 Demonstrate understanding of systems as well as of components of systems.	<ol style="list-style-type: none"> 1. Demonstrate understanding of the interactions and constraints in the behaviour of the building enclosure in the context of the overall building as well as other functions that the building enclosure may perform. 2. Demonstrate understanding of the integration of the building enclosure system with the other building systems.

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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>Demonstrate awareness of project concerns and roles of other stakeholders in the project stages:</p> <ol style="list-style-type: none"> 1. Identification: generation of the initial project idea and preliminary design 2. Preparation: detailed design of the project addressing technical and operational aspects 3. Appraisal: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives 4. Preparation of specifications and tender documents: preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work 5. Implementation and monitoring: implementation of project activities, with ongoing checks on progress and feedback 6. Evaluation: periodic review of project with feedback for next project cycle <p>For non-construction projects, demonstrate exposure to all phases of the project from initial considerations and client contact to final conclusions</p>
	<p>1.9 This competency is intended to demonstrate your understanding of the role of peer review and quality management that is essential to engineering practice in Canada.</p>	<ol style="list-style-type: none"> 1. Demonstrate an understanding of roles and responsibilities of others in the construction quality assurance and control process (architect, contractors, testing agencies). 2. Demonstrate quality control in the production of drawings, calculations and reports, including review by the supervising professional. 3. Conduct site visits to observe and verify construction of building enclosure elements, and write field review reports for the purpose of confirming substantial compliance with the construction documents and the building code. 4. Identify deviations from the design intent as well as variations in site conditions from those planned or expected and respond appropriately to site changes or work that is not compliant. 5. Review test results, manufacturers' product information, shop drawings, prototypes, and samples in order to assist in determining whether the construction of the building enclosure is in substantial compliance with the construction documents. 6. Demonstrate an understanding of the difference between Quality Control and Quality Assurance
	<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"> 1. Design and prepare detail drawings that clearly identify the work required at various building enclosure locations and identify if designs produced by others adequately address required performance 2. Produce sketches, notes, documentation and design documents to prepare proposals, preliminary, and final design drawings for acceptance by the client and approval by regulatory authorities 3. Incorporate figures and sketches into reports to convey engineering opinions 4. Review designs of others and communicate findings and issues, including suggested alternatives

Guidance on Civil - Municipal/Infrastructure Indicators

COMPETENCY CATEGORY	COMPETENCIES (10)	CIVIL - MUNICIPAL/INFRASTRUCTURE INDICATORS (guidance on example content that will demonstrate the competency)
1. Technical Competence (10 competencies)	1.1 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards. This includes local engineering procedures and practices as applicable.	<ol style="list-style-type: none"> 1. Identify and comply with legal and regulatory requirements for project activities 2. Prepare Permit Applications 3. Incorporate knowledge of codes and regulations in design materials 4. Prepare reports on standards and project compliance 5. Recognize the need to design for code compliance while achieving constructability 6. Interpret and apply regulations that affect the handling, transportation and disposal of waste materials
	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.	<ol style="list-style-type: none"> 1. Demonstrate knowledge of materials and/or operations: Cost, Storage, Quality & Handling problems 2. Develop and implement evaluation, maintenance or rehabilitation programs for infrastructure and operations 3. Coordinate with other disciplines
	1.3 Analyze technical risks and offer solutions to mitigate the risks.	<ol style="list-style-type: none"> 1. Demonstrate familiarity with system protection objectives, philosophies, and functions 2. Identify risk areas 3. Develop risk management plans 4. Demonstrate an understanding of the difference between technical risk and public safety issues

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	1.4 Apply engineering knowledge to design solutions.	<ol style="list-style-type: none"> 1. Collect, record, and analyze information from sources such as geological reports, subsurface investigations, and in situ testing 2. Calculate material quantities and volumes using mathematical formulae, measurements and data from construction drawings and specifications 3. Prepare technical specifications 4. Conduct inventories of water supplies and assess impact of projected population growth on water supply demands 5. Design sanitary sewer systems 6. Conduct model and flow analysis for public sewer facility design 7. Demonstrate knowledge of lift station design 8. Conduct inflow/outflow infiltration studies 9. Design water treatment facilities (e.g. operations for sedimentation, flocculation and coagulation, filtering, disinfection and chlorination) 10. Apply methods of alternate technology (e.g. precipitation, absorption oxidation and ion exchange to remove metals and soften water) 11. Use standard methods for the treatment of waste water (sample and assess waste water for physical, chemical and microbiological characteristics using tests; Select treatment processes for septic tanks and tile beds) 12. Select tertiary treatments for waste water
	1.5 Be able to understand solution techniques and independently verify the results.	<ol style="list-style-type: none"> 1. Demonstrate an understanding of the engineering principles used in the application of computer design programs 2. Participate in an independent review process
	1.6 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards pertaining to safety.	<ol style="list-style-type: none"> 1. Identify and incorporate safety procedures, processes, and equipment 2. Review and incorporate safety or system operating procedures 3. Demonstrate specific knowledge of safety regulations 4. Incorporate explicit human and public safety considerations in design and all other professional activities
	1.7 Demonstrate understanding of systems as well as of components of systems.	<ol style="list-style-type: none"> 1. Calculate and assess current or projected infrastructure needs according to their area of practice 2. Demonstrate an understanding of each element in the process, and the infrastructure required

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	1.8 Exposure to all stages of the process/project life cycle from concept and feasibility analysis through implementation.	1. Demonstrate awareness of project concerns and roles of other stakeholders in the project stages: <ul style="list-style-type: none"> ◦ Identification: generation of the initial project idea and preliminary design ◦ Preparation: detailed design of the project addressing technical and operational aspects ◦ Appraisal: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives ◦ Preparation of specifications and tender documents: preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work ◦ Implementation and monitoring: implementation of project activities, with ongoing checks on progress and feedback ◦ Evaluation: periodic review of project with feedback for next project cycle
	1.9 This competency is intended to demonstrate your understanding of the role of peer review and quality management that is essential to engineering practice in Canada.	1. Conduct field checks to verify the validity of design 2. Follow Quality Management principles in practice 3. Prepare quality control plans, including frequency and test parameters, for specific construction processes or products 4. Evaluate test results and determine adequacy 5. Carry out or supervise field testing of materials or construction processes
	1.10 Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.	1. Demonstrate familiarity with CAD software and techniques for specific design requirements 2. Demonstrate knowledge of capture and validation of as-built information 3. Prepare complete drawings with sufficient cross sections and details and eliminate any discrepancies; provide technical specification; refer to the related items of the specification on each part and detail on the drawings 4. Prepare rough sketches for the drafter and explain your intentions 5. Review designs of others and communicate findings and issues, including suggested alternatives

Guidance on Electrical - Power & Industrial Indicators

COMPETENCY CATEGORY	COMPETENCIES (10)	ELECTRICAL - POWER AND INDUSTRIAL INDICATORS (guidance on example content that will demonstrate the competency)
1. Technical Competence (10 competencies)	1.1 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards. This includes local engineering procedures and practices as applicable.	1. Identify and comply with legal and regulatory requirements for project activities 2. Incorporate knowledge of codes and regulations in design materials 3. Prepare reports on standards and project compliance 4. Recognize the need to design for code compliance while achieving constructability
	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.	1. Have knowledge of plant layout and operations 2. Prepare technical specifications 3. Coordinate with equipment vendors and other discipline engineers 4. Demonstrate involvement with feasibility studies
	1.3 Analyze technical risks and offer solutions to mitigate the risks.	1. Demonstrate familiarity with system protection objectives, philosophies, and functions 2. Identify risk areas 3. Develop risk minimization plans
	1.4 Apply engineering knowledge to design solutions.	1. Demonstrate an understanding of the engineering principles used in the application of computer design programs 2. Demonstrate use of theory and calculations to arrive at solutions 3. Demonstrate why a unique design solution could not be accomplished with a standard design solution 4. Calculate fault levels and select equipment to withstand the available fault current 5. Understand ground currents and potential rise and design a grounding system that would protect life and property 6. Perform load calculations for sizing service and distribution equipment including future provisions 7. Design circuits and systems with consideration for efficiency and power quality 8. Using engineering principles, determine voltage level, transformation and distribution methods that provide the most economic and sustainable system 9. Understand source and cause of harmonics and methods used to minimize the effects of harmonics on the system 10. Design electrical control and protection schemes for transmission and distribution systems

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	1.5 Be able to understand solution techniques and independently verify the results.	<ol style="list-style-type: none"> 1. Demonstrate an understanding of the engineering principles used in the application of computer design programs 2. Perform field checks
	1.6 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards pertaining to safety.	<ol style="list-style-type: none"> 1. Identify and use relevant safety procedures, processes, and equipment 2. Develop maintenance programs 3. Design test plans and equipment 4. Implement inspection results 5. Review and alter safety or system operating procedures when necessary 6. Demonstrate specific knowledge of safety regulations
	1.7 Demonstrate understanding of systems as well as of components of systems.	<ol style="list-style-type: none"> 1. Demonstrate a working knowledge of the basic components of power generation 2. Manage processes within the overall system (monitor and, where needed, modify processes to achieve optimum outcomes)
	1.8 Exposure to all stages of the process/project life cycle from concept and feasibility analysis through implementation.	<ol style="list-style-type: none"> 1. Demonstrate participation in or exposure to all stages of the project life cycle: <ul style="list-style-type: none"> ◦ Identification: generation of the initial project idea and preliminary design ◦ Preparation: detailed design of the project addressing technical and operational aspects ◦ Appraisal: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives ◦ Preparation of specifications and tender documents: preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work ◦ Implementation and monitoring: implementation of project activities, with ongoing checks on progress and feedback ◦ Evaluation: periodic review of project with feedback for next project cycle
	1.9 This competency is intended to demonstrate your understanding of the role of peer review and quality management that is essential to engineering practice in Canada.	<ol style="list-style-type: none"> 1. Demonstrate peer review 2. Demonstrate completed project, systems or sub-systems meet project objectives 3. Participate in regular meetings and discussions with project members, both electrical and other disciplines, to ensure quality, scheduling, deadlines and budgeting are not compromised during both design and construction stages 4. Review designs, procedures and manuals to ensure design guidelines are adhered to. Consult with and seek input, including design and field review, from other project members throughout the project design and construction 5. Perform testing and commissioning upon completion of the product/project to ensure all design criteria, terms and conditions and applicable safety standards and regulations have been met 6. Demonstrate understanding of ISO 9000

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	1.10 Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.	<ol style="list-style-type: none"> 1. Demonstrate communication of ideas and concepts to project team members 2. Demonstrate produced design documents required minimum additional interaction with other designers, contractors and commissioning personnel 3. Demonstrate the value of project completion reports and lessons learned reports to application in future projects by self or others 4. Understand established and acceptable symbols and terminology used in preparation of design drawings 5. Create sketches, notes and documentation to prepare proposals, preliminary, and final design drawings for acceptance by the client and approval by regulatory authorities

Guidance on Materials, Metallurgical & Mineral Processing Indicators

COMPETENCY CATEGORY	COMPETENCIES (10)	MATERIALS, METALLURGICAL, AND MINERAL PROCESSING INDICATORS (guidance on example content that will demonstrate the competency)
1. Technical Competence (10 competencies)	1.1 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards. This includes local engineering procedures and practices as applicable.	<ol style="list-style-type: none"> 1. Identify and comply with legal and regulatory requirements for project activities 2. Incorporate knowledge of codes and regulations in your area of practice 3. Understand regulations that affect the handling, transportation and disposal of waste materials 4. Experience using standards (e.g. ASTM) for testing 5. Demonstrate awareness of safety documents, standards and regulations (e.g. Work-Safe/Workers' Compensation Board, ASHRAE, material safety data sheets)
	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.	<ol style="list-style-type: none"> 1. Demonstrate knowledge of materials application, usage and/or operations: cost, storage, quality & handling problems 2. Develop and implement evaluation, maintenance or rehabilitation programs for facilities and operations 3. Coordination with other disciplines 4. Materials selection and design for specific applications (e.g. biomedical, automotive, aerospace, electronics)
	1.3 Analyze technical risks and offer solutions to mitigate the risks.	<ol style="list-style-type: none"> 1. Demonstrate familiarity with metallurgical system protection objectives, philosophies, and functions 2. Identify risk areas 3. Demonstrate an understanding of the development of risk management plans 4. Demonstrate an understanding of the difference between technical risk and public safety issues 5. Demonstrate awareness of Statistical Process Control and its role in detecting process deviations and associated risks

COMPETENCY CATEGORY	COMPETENCIES (10)	MATERIALS, METALLURGICAL, AND MINERAL PROCESSING INDICATORS (guidance on example content that will demonstrate the competency)
	1.4 Apply engineering knowledge to design solutions.	<ol style="list-style-type: none"> 1. Perform heat and mass balance calculations including data reconciliation 2. Report on metallurgical accounting in a plant 3. Circuit design and selection. Equipment sizing including throughput, residence time, and chemical kinetics calculations 4. Failure analysis using microstructural and analytical characterization techniques (OM, SEM, TEM, XRD, AA). Demonstrate understanding of failure modes (e.g. creep, fatigue, corrosion, hydrogen cracking) 5. Use of equilibrium phase diagrams (temperature-composition, eH-pH, and Evans Diagrams) or non-equilibrium diagrams (TTT diagrams), or experimental determination of phase equilibria 6. Perform alloy composition calculations. Demonstrate understanding of effects of alloying ingredients and strengthening mechanisms 7. Demonstrate pilot-scale testing of new processes 8. Design and implementation of environmental control technologies for gas, liquid, and solid waste streams. Demonstrate understanding of strategies for tailings disposal 9. Demonstrate understanding of mechanical properties and testing: stress-strain behaviour, fracture mechanics, fatigue, creep, toughness 10. Design for corrosion prevention (coatings, thin films, materials selection) 11. Design weld parameters and prepare welding procedures
	1.5 Be able to understand solution techniques and independently verify the results.	<ol style="list-style-type: none"> 1. Participate in an independent review process 2. Demonstrate an understanding of the engineering principles used in the application of computer design programs
	1.6 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards pertaining to safety.	<ol style="list-style-type: none"> 1. Use of non-destructive evaluation techniques for weld evaluation 2. Review and assess results for equipment and material evaluation 3. Understand and account for safety risks associated with processes. Identify relevant metallurgical processes and personal protection equipment to mitigate safety risks 4. Review, identify and incorporate safety procedures, system operating procedures, processes and equipment 5. Demonstrate specific knowledge of safety regulations 6. Incorporate explicit human and public safety considerations in design and all other professional activities
	1.7 Demonstrate understanding of systems as well as of components of systems.	<ol style="list-style-type: none"> 1. Demonstrate understanding of complex process flow diagrams and of each unit operation in the process 2. Develop process improvement initiatives. Demonstrate understanding of continuous improvement philosophy and practice 3. Demonstrate understanding of effects of process modifications on downstream processes and final product 4. Demonstrate familiarity with control systems and strategies. Demonstrate understanding of limitation of process control

COMPETENCY CATEGORY	COMPETENCIES (10)	MATERIALS, METALLURGICAL, AND MINERAL PROCESSING INDICATORS (guidance on example content that will demonstrate the competency)
	1.8 Exposure to all stages of the process/project life cycle from concept and feasibility analysis through implementation.	1. Demonstrate awareness of project concerns and roles of other stakeholders in the project stages: <ul style="list-style-type: none"> ◦ Identification: generation of the initial project idea and preliminary design ◦ Preparation: detailed design of the project addressing technical and operational aspects ◦ Appraisal: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives ◦ Preparation of specifications and tender documents: preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work ◦ Implementation and monitoring: implementation of project activities, with on-going checks on progress and feedback ◦ Evaluation: periodic review of project with feedback for next project cycle
	1.9 This competency is intended to demonstrate your understanding of the role of peer review and quality management that is essential to engineering practice in Canada.	1. Conduct field checks to verify the validity of design and fabrication 2. Follow Quality Management principles in practice 3. Prepare quality assurance plans, including frequency and test parameters, for specific construction processes or products 4. Evaluate test results and determine adequacy 5. Carry out or supervise field testing of materials or welds 6. Carry out or supervise implementation of new processing equipment
	1.10 Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.	1. Demonstrate communication of ideas and concepts to project team members 2. Demonstrate understanding of value of project completion reports and lessons learned reports, to application in future projects by self or others 3. Review designs of others and communicate findings and issues, including suggested alternatives 4. Develop welding data cards

Guidance on Project & Construction Management Indicators

COMPETENCY CATEGORY	COMPETENCIES (10)	PROJECT AND CONSTRUCTION MANAGEMENT INDICATORS (guidance on example content that will demonstrate the competency)
1. Technical Competence (10 competencies)	1.1 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards. This includes local engineering procedures and practices as applicable.	<ol style="list-style-type: none"> 1. Identify and comply with legal and regulatory requirements for project activities 2. Ensure incorporation of codes and regulatory requirements in design materials 3. Prepare reports assessing project compliance with codes, standards, and legal/regulatory requirements 4. Recognize the need to design for code compliance while achieving constructability
	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.	<ol style="list-style-type: none"> 1. Demonstrate knowledge of materials, operations, project and design constraints, e.g. actual cost vs budgeted cost, design, material, labour, time, production 2. Demonstrate understanding of and coordination with other engineering and professional disciplines
	1.3 Analyze technical risks and offer solutions to mitigate the risks.	<ol style="list-style-type: none"> 1. Demonstrate familiarity as applicable, with system protection, security and/or damage/hazard mitigation objectives, philosophies, practices, procedures, and functions 2. Analyze and manage project risk as it might affect successful completion of a project regarding cost, schedule and performance and/or scope objectives 3. Identify risk areas including causes of risks and their impacts 4. Develop risk management/mitigation plans 5. Demonstrate an understanding of the difference between technical risk and risk to the public interest/public safety issues
	1.4 Apply engineering knowledge to design solutions.	<ol style="list-style-type: none"> 1. Oversee and review the specifications and drawings for the project. Develop the project requirements for the selection of the designer 2. Demonstrate use of theory and calculations to arrive at solutions 3. Demonstrate the development or management of a unique design solution that could not be accomplished with a standard design solution 4. Carry out design and shop drawing reviews
	1.5 Be able to understand solution techniques and independently verify the results.	<ol style="list-style-type: none"> 1. Demonstrate an understanding of the engineering principles used in the application of computer design programs and show/describe how the results were verified as correct either by the applicant or by the applicant in collaboration with others 2. Participate in an independent review and verification of solution techniques or analysis

COMPETENCY CATEGORY	COMPETENCIES (10)	PROJECT AND CONSTRUCTION MANAGEMENT INDICATORS (guidance on example content that will demonstrate the competency)
	<p>1.6 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards pertaining to safety.</p>	<ol style="list-style-type: none"> 1. Identify, incorporate, and/or participate in review of safety considerations, safety procedures and safety equipment as they apply to system operations and/or maintenance programs 2. Conduct Job Hazard Analysis (JHA) for all scheduled activities in collaboration with all professionals involved in the construction project (architect, structural engineering firm, entrepreneur, etc.), produce safe job practices for JHA activities and manage prevention of accidents 3. Demonstrate specific knowledge of safety and Work-Safe/Workers' Compensation Board regulations and verify safety and environmental certifications 4. Conduct regular safety meetings 5. Ensure compliance with safety requirements including documented on-site safety inspections 6. Incorporate explicit human and public safety considerations in design and all other professional activities 7. Understand and account for safety risks associated with processes. Identify relevant protection equipment and process modifications to mitigate safety risks 8. Understand the principles of "behavior based safety" and ensure it has been adopted through demonstration of its application
	<p>1.7 Demonstrate understanding of systems as well as of components of systems.</p>	<ol style="list-style-type: none"> 1. Demonstrate an understanding of each element in a process and an understanding of the desired engineered solution (e.g. building, transportation solution, electrical installation, etc) 2. Demonstrate an understanding of the interactions and constraints in the behaviour of the overall system 3. Manage processes within the overall system (monitor and, where needed, modify processes to achieve optimum outcomes)
	<p>1.8 Exposure to all stages of the process/project life cycle from concept and feasibility analysis through implementation.</p>	<ol style="list-style-type: none"> 1. Demonstrate awareness of project concerns and roles of other stakeholders in the project stages: <ul style="list-style-type: none"> ◦ Identification: generation of the initial project idea and preliminary design ◦ Preparation: detailed design of the project addressing technical and operational aspects ◦ Appraisal: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives ◦ Preparation of specifications and tender documents: preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work ◦ Implementation and monitoring: implementation of project activities, with ongoing checks on progress and feedback ◦ Evaluation: periodic review of project with feedback for next project cycle

COMPETENCY CATEGORY	COMPETENCIES (10)	PROJECT AND CONSTRUCTION MANAGEMENT INDICATORS (guidance on example content that will demonstrate the competency)
	<p>1.9 This competency is intended to demonstrate your understanding of the role of peer review and quality management that is essential to engineering practice in Canada.</p>	<ol style="list-style-type: none"> 1. Draft, develop and implement a master quality plan for the project, including site verification, quality control verification/testing and sampling plan, etc. 2. Arrange for and obtain performance tests, witnessing of said tests and other reviews as necessary to ensure that material and equipment meet quality and performance requirements 3. Evaluate test results, determine adequacy, and develop recommended action 4. Conduct checks including field checks to ensure commissioning is done properly, approved and signed off 5. Ensure all quality management principles or practices are followed during the course of the project 6. Prepare quality control plans, including frequency and test parameters, for specific processes or products 7. Ensure that independent peer review and validation of design has been completed 8. Produce quality control and quality inspection and non-conformance and corrective and preventive action (CAPA) reports 9. Demonstrate completed project, systems or sub-systems meet project objectives in terms of quality and operational performance
	<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"> 1. Demonstrate the ability to review designs of others and communicate findings and issues, including suggested alternatives 2. Demonstrate communication of ideas and concepts to project team members 3. Demonstrate understanding of value of project completion reports and lessons learned reports to application in future projects by self or others 4. Produce sketches, notes, schedules, documentation and design documents to prepare proposals, preliminary and final design drawings for acceptance by the client and approval by regulatory authorities

Guidance on Structural Indicators

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

COMPETENCY CATEGORY	COMPETENCIES (11)	STRUCTURAL INDICATORS (guidance on example content that will demonstrate the competency)
	1.4 Apply engineering knowledge to design solutions.	<ul style="list-style-type: none"> • Demonstrate through examples: <ol style="list-style-type: none"> 1. Knowledge of loads and climactic data 2. Tolerances, concrete placement, reinforcement, embedment, and welded and bolted connections 3. Knowledge of overall design of a structure and its response to the loads and demands 4. Understanding issues of serviceability and long term maintenance and function 5. Selection of structural system, and material to be used for the project 6. Ability to design in more than one material 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 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) 9. Design to account for effects of elastic shortening, creep, shrinkage, relaxation of pre-stressing strands and differential settlement 10. Design to account for temperature variations 11. Identify and accommodate site-specific logistical issues in design and construction plans 12. Demonstrate seismic knowledge using capacity design principles (mandatory for Engineers and Geoscientists BC applicants)
	1.5 Be able to understand solution techniques and independently verify the results.	<ol style="list-style-type: none"> 1. Demonstrate an understanding of the engineering principles used in the application of computer design programs 2. Understand and have the ability to do approximate analysis to independently verify the results of technical software and solution 3. Participate in an independent review process
	1.6 This competency is intended to demonstrate your knowledge and awareness of Canadian regulations, codes and standards pertaining to safety.	<ol style="list-style-type: none"> 1. Be aware of safety risks associated with the construction of the structure 2. Demonstrate an understanding of safety regulations for construction, presence of adjacent structures, geotechnical considerations, impact to the environment 3. Demonstrate specific knowledge of safety regulations 4. Understanding of site safety and Workers' Compensation Act 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 6. Incorporate explicit human and public safety considerations in design and all other professional activities
	1.7 Demonstrate understanding of systems as well as of components of systems.	<ol style="list-style-type: none"> 1. Demonstrate an understanding of the interactions and constraints in the behaviour of the overall system 2. Understand the role and responsibility of a specialty structural engineer 3. Understand the integration of components to generate load paths

COMPETENCY CATEGORY	COMPETENCIES (11)	STRUCTURAL INDICATORS (guidance on example content that will demonstrate the competency)
	<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"> ◦ Identification: generation of the initial project idea and preliminary design ◦ Preparation: detailed design of the project addressing technical and operational aspects ◦ Appraisal: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives ◦ Preparation of specifications and tender documents: preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work ◦ Implementation and monitoring: implementation of project activities, with on-going checks on progress and feedback ◦ Evaluation: periodic review of project with feedback for next project cycle
	<p>1.9 This competency is intended to demonstrate your understanding of the role of peer review and quality management that is essential to engineering practice in Canada.</p>	<ol style="list-style-type: none"> 1. Demonstrate Quality Control in the production of structural drawings & engineering calculations and reports, including review by the supervising professional 2. Participate in independent structural concept review by a third party professional engineer 3. Conduct site visits to observe and verify construction process as well to write field reviews for as built structural conformance to construction drawings 4. Review shop drawings for compliance with design 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 6. Operate in an ISO9001-certified environment
	<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"> 1. Supervise the drafting of his/her design and produce sketches for the drafters/CAD technicians, and demonstrate document coordination and control 2. Ensure that drawings reflect the design models and required behaviour 3. Produce technical specifications for construction 4. Be able to review and analyze designs of others and communicate findings and suggest alternatives
<p>2. Professional Accountability (4 competencies)</p>	<p>2.1 Demonstrate awareness of professional accountability.</p>	<ol style="list-style-type: none"> 1. Awareness of the potential professional liability involved in all aspects of the design, construction and inspection process. 2. Structural applicants only: Understand the role of the StructEng and Independent Peer Reviews of work