

# **Structural Engineering Services in Whitby by Licensed Professional Structural Engineers**

Providing structural engineering designs of structural framings, footings, and foundations, to general building structure in Ontario including Whitby (Town of Whitby including Ashburn, Brooklin, Myrtle, and Myrtle Station) is a core component of our practice.

We work closely with architects, planning consultants, developers and architectural designers and we have been recognized as one of the top structural engineering partners by leading architects and interior designers in Ontario including Whitby (Town of Whitby including Ashburn, Brooklin, Myrtle, and Myrtle Station).

An architect does not have to see the constraints of structural reality as limits; constraints can be a powerful creative motivator. Our structural engineers love the architects who stimulate our innovation. Our structural and municipal engineers collaborate with architectural design teams on projects from interior renovations to commercial, industrial, institutional and residential subdivisions—bringing their deep expertise and a rigorous approach to solving problems. Our structural engineers thrive on the creativity and zeal that is at the heart of the successful, collaborative design relationships we share with our architects and other design partners.

Success of many architects' projects rely on inventive approach to structural engineering, and though designing an economical engineering structure is challenging, with creative approach and focusing on innovation and efficient use of materials, our structural engineers always find the most appropriate structural engineering design solution for architects and other design partners. Our experience is that there are several solutions — not only one economic or efficient optimum solution.

Our [structural and municipal engineers](#) work as an integrated team with architects, developers and other design partners. Our structural and municipal engineers enjoy their close association and collaboration with architects and other design partners and have very pleasant and productive relationships with architects, developers, municipalities and other stake holders.

Our licensed Professional Structural Engineers offer structural analysis and design services for new construction projects including Pre-Engineered Building Foundation Design, Load Bearing Walls & Seismic Design and rehabilitation of existing buildings including Parking Garage Repairs - Ledger beams, deck re-design, bearing pads, drainage remediation, slabs and columns in Ontario including Whitby (Town of Whitby).

Our licensed professional structural engineers and support staff are committed to services of the highest quality, regardless of whether the project is a small or a huge complex structural framing project in Ontario including Whitby (Town of Whitby).

Regardless of the nature of the project whether the project is rehabilitation of structures, replacement of structures, or new structures, our licensed professional structural engineers are well experienced in designing with a variety of building materials for structures, including steel, concrete, masonry and wood.

Our licensed professional structural engineers combine structural analysis with experience and knowledge to create structural engineering designs that meet Ontario Building Code and project requirements.

Our licensed professional structural engineers also prepare drawings indicating the location, sizes and quantities of materials, and specifications indicating the quality of materials and required performance of structural systems.

Our well experienced licensed professional structural engineers provide innovative and cost-effective structural engineering design solutions to commercial, industrial, institutional and multi residential projects in in Ontario including Whitby (Town of Whitby).

Detailed accurate specifications prepared by our licensed professional structural engineers with decades of experience, reduce or prevent unexpected additional costs.

Our licensed professional structural engineers prepare required stamped structural engineering for

- Foundation Designs including Pre-engineered Building Foundations in Ontario including Whitby (Town of Whitby)

- Retaining Walls in Ontario including Whitby (Town of Whitby)
- Structural design for Office Buildings, Commercial Retail Buildings, Restaurants, Gas Station Canopies, Low Rise freestanding Industrial Buildings, Multi-Storey Apartment Buildings in Ontario including Whitby (Town of Whitby including Ashburn, Brooklin, Myrtle, and Myrtle Station)

Our licensed professional structural engineers also provide design services for building components such as stairs, miscellaneous metals, non-load bearing walls, steel member connections, timber connectors, light gauge steel connection details and metal stud back-up to veneer walls. Our licensed professional structural engineers' typical structural engineering work includes:

- Design of the primary structural system for gravity and lateral loads;
- Design of proprietary components to be incorporated into the primary structural system;
- Design of secondary components not part of the primary system but requiring inherent structural integrity, such as cladding systems, roofing systems or balcony railings;
- Review of shop drawings; and
- General review of construction as required by the Building Code, and the Town of Whitby with the plans and other drawings that form the basis for the issuance of the permit by the Town of Whitby.

Our licensed professional structural engineers work with the clients and the design/build contractor to define a scope of work that enables them to provide the required designs, specifications, contract documents, and/or contract administration and applicable codes and standards—especially where they affect the structural integrity of the building.

**Our licensed professional structural engineers use state of the art technology including [STAAD PRO](#) software.**

While incorporating the requirements our clients, our licensed professional structural engineers

- abide by the requirements of the current applicable codes, acts and regulations, usually includes, but is not limited to, the National Building Code of Canada; National Building Code structural commentaries; the Ontario Building Code; CSA standards, as appropriate; and publications and design guides from trade associations such as [Canadian Institute of Steel Construction](#) (CISC), The [Canadian Sheet Steel Building Institute](#) (CSSBI), [Canadian Portland Cement Association](#) (CPCA), [Canadian Wood Council](#) (CWC), [Canadian Prestressed Concrete Institute](#) (CPCI), etc.
- establish the loads and structural resistance for the structural design; and

- recommend any specialized services related to the structural design process that are required for completion of the project.

In preparing final plans and specifications, our licensed professional structural engineers

- analyze and design the structural system in conformity with applicable codes and regulations;
- analyze and design each element of the system or, where elements are to be designed by others, provide appropriate design criteria;
- prepare clear design briefs stating the applicable codes, loads, assumptions and design criteria for the analysis and design of the system and its components;
- cooperate with the other design professionals during system design, responding to their requests, taking into account their requirements, and advising them of functional aspects of the system that may affect the design of their systems;
- cooperate with others in their preparation of cost estimates and schedules from time to time, based upon the most accurate information available as the design develops; and
- advise the client and/or the general contractor that structural elements designed by others are to be designed by engineers according to specifications and Ontario Building Code requirements

In the design development stage, the selected preliminary design is developed in sufficient depth to complete construction details and permit work on construction documents to begin.

During this stage, our licensed professional structural engineers,

- attend meetings with the client and other stakeholders to coordinate the flow of design information among the other design team members;
- cooperate with the other stakeholders, responding to their requests, taking into account their requirements, and advising them of functional aspects of the primary structural system that may affect the design of their components;
- analyze and design the structural system in conformity with applicable codes and regulations;
- review serviceability limits, such as: deflections, vibration, lateral drift, concrete and masonry crack control, foundation settlement and soil-structure interaction;
- review reports by specialized services such as geotechnical, vibration analysis and wind tunnel testing, and incorporate recommendations into the primary design;
- prepare structural analysis and design calculations for the primary structural system components;
- prepare foundation designs based on recommendations in the geotechnical investigation report;
- prepare the framing design and design detail sketches showing layouts of typical areas

- prepare or edit outline specifications for structural components; and
- coordinate the structural design with deflection and lateral movement criteria to meet requirements of other specialty engineers.

In conjunction with designing the primary structural system, our licensed professional structural engineers, with respect to primary structural elements, connection details and proprietary products, specify types of elements, their positions within the structure and methods of connecting to the primary structural system; and determine and specify in the contract documents the elements that are to be designed by other specialty engineers, and specify loads and design criteria for use by other specialty engineers in their design.

With respect to non-structural elements attached to the primary structural system, our licensed professional structural engineers design the primary structural system to accept and support such elements; and indicate the assumed design loads applied to the primary structural system by the non-structural elements.

Our licensed professional structural engineers prepare calculations to support the structural design of the primary structural system. The calculations should contain a table of contents or index and must clearly show and delineate service loads, factored loads and factored load combinations. The structural calculations should be dated, legible and retained in a project file.

A copy of input and output of computer analysis should be included in the project file, along with a description of the software used. In general, structural calculations by our licensed professional structural engineers typically include:

- the design criteria;
- a discussion and description of the design basis, including assumptions;
- the standards referenced, with edition dates;
- a list of live loads, environmental loads such as wind, snow and seismic criteria, and any other special loads;
- specifications for materials used;
- geotechnical report information and design criteria;
- deflection limitations of structural elements and systems;
- location diagrams for structural elements;
- vertical load analysis and design of roof structures, floor structures, frames or trusses, columns, walls and foundations;
- lateral load analysis and design for seismic and wind forces;
- computer analysis and design results; and
- special analysis, such as dynamic and vibration analyses.

Our licensed professional structural engineers provide the technical sections of specifications for all structural design work including

- the scope of work;
- standards, codes and bylaws governing the work;

- submittals required;
- quality control requirements;
- materials and tolerances;
- workmanship and fabrication;
- criteria for temporary works;
- field review of construction, inspection and testing;
- provisions for the contractor to provide notification before commencing;
- significant steps of the work;
- trade warranties; and
- erection information, where necessary, to ensure the intent and integrity of the design.

Structural Foundation Design prepared by our licensed professional structural engineers typically include

- grid lines and grid line dimensions as well as overall dimensions and structurally derived dimensions;
- the types, sizes, locations and details of foundations for columns, walls, piers, equipment and any other structural loadbearing components;
- the anticipated bearing elevations for foundations;
- any drainage or dewatering system or requirements;
- the foundation system installation sequence, if important to the structural design;
- sub-grade preparation for slabs-on-grade, as well as the thickness, reinforcing and elevation of the slabs-on-grade;

- estimated pile lengths and capacities, or a source for this information;
- frost-safe soil cover or equivalent insulation requirements for shallow foundations;
- the approximate location of existing services and foundations, or any other relevant site information that may conflict with the proposed foundations and
- allowable SLS and ULS soil or rock-bearing capacity, pile capacities and lateral earth pressures for retaining structures with reference to pertinent geotechnical reports.

Structural Framing plans of floors, roofs and elevations of walls prepared by our licensed professional structural engineers typically include

- grid lines and structurally derived dimensions, dimensions to outside of structural floor plate from grid or overall dimensions of floor plate;
- all pertinent design loads broken down into the various load cases. This includes uniform area loads, variable roof snow accumulations diagrams and point loads for equipment including the load positions. The drawings must indicate whether loads noted are service or factored loads;
- slopes and depressions, or references to drawings by others that show that information;
- sizes, locations, dimensions and details of structural elements;

- for cantilever suspended span (Gerber) systems, include beam cantilever lengths and splice locations;
- locations, sizes and framing details or reinforcing around major member openings;
- reference elevations of floors or roof(s);
- wall framing elevations showing girts and bracing, including calculated forces, for steel framed buildings;
- reinforcing bar sizes and spacing for concrete members, with fabrication and placing criteria;
- conditions at change of elevation of the structure, conditions at intersections of different structural materials, and at interaction of structural and non-structural components;
- calculated member end forces, moments, shears or torsion required for connection design by others (governing combined factored connection forces should be provided);
- locations and details of control, construction and expansion joints; and
- provision for future extensions

Structural Column information, prepared by our licensed professional structural engineers usually provided in tables or line diagrams include

- elevations of the bottom and top of columns;
- member sizes;
- reinforcing elements for concrete columns;

- proposed splice locations and splice details for structural steel and concrete columns;
- column axial loads and bending moments to be resisted at base and at splices; and
- stiffeners, lateral bracing and local reinforcements for steel elements.

Structural detail drawings prepared by our licensed professional structural engineers (depending on the materials used) typically include

- masonry bearing and shear wall details, including masonry unit and mortar strengths, details of reinforcing, support of loads, lintels and grouting procedures;
- reinforced concrete member details, such as geometry, reinforcing, etc., sufficiently detailed to enable others to prepare reinforcing plans and details as well as bar lists;
- wood shear wall details, including nailing patterns and end anchorages or factored anchorage forces if connectors are to be designed by other specialty engineers;
- elevations and details of custom-designed trusses, including splice locations and calculated member forces for each member if specialty engineers are required to detail the interconnections between the members; and
- timber members and connection details, or end forces

Per [OPSS 353](#), concrete shall not be placed until the surface on which the concrete is to be placed, and the forms, have been inspected by the Geotechnical and/or Structural Engineer.

Before placing concrete, the Contractor shall wet down the sub-grade immediately ahead of concrete placing by means of a uniform spray of water sufficient to wet the sub-grade thoroughly without leaving standing water. The concrete shall be placed and compacted in a manner such that segregation of the aggregate does not occur.

As per [OPSS 350](#) concrete shall not be placed when the ambient air temperature is below 0°C and shall not be placed against any materials whose temperature is below 5°C. The concrete temperature at the time of discharge from the truck shall be between 10°C and 28°C as per [OPSS 1350](#).

The Contractor shall provide protection to ensure the minimum in place temperature of the concrete pavement or concrete base is 15°C for the first three days of curing, and at 10°C for the subsequent 4 days.

As per [OPSS 314](#), winter grading of granular dictates all ice and snow shall be removed from all portions of the work area.

Frozen material shall not be incorporated into the work. Materials shall not be placed over frozen ground, except at the Contractor's option and reviewed by the Geotechnical Engineer, Structural Engineer and the Town of Whitby.

Should this scenario be accepted, a single lift may be placed over frozen ground; in which case final grading and compaction shall be done after the underlying material has thawed.

Building or structural foundations and concrete pads/platforms are to be constructed per the Town of Whitby approved design drawings and OPSS 350 (construction specifications of concrete works) and OPSS 1350 (concrete materials and production). The Consultant Engineer is to ensure the Structural Engineer and/or the Geotechnical Engineer reviews the formworks and mix designs prior to concrete being poured. The Structural/Geotechnical Engineer is to inspect the works during construction to ensure reinforcing steel or other concrete base structure materials meet the materials, size and spacing specifications as outlined in the design or per recent OPSS structural standards.

As per OPSS 353, the concrete on the upper surfaces shall be floated to a smooth uniform finish of the required cross section, free of open texturing, plucked aggregate and local projections. Only hardwood or magnesium trowels shall be used for hand finishing. Sidewalks are to be broom finished.

Our Licensed Professional Structural Engineers offer Structural Engineering Design and Stamped Structural Engineering Drawings to obtain site plan approval and building permits to construct commercial, industrial, institutional and multi residential new construction in Ontario including Whitby (Town of Whitby), with several decades of structural engineering experience.

Having vast experience in structural engineering design, we offer effective, innovative and cost efficient structural engineering designs and stamped structural engineering drawings to our clients.

Our well experienced structural engineers' proficiency in conceptualizing designs and plan in accordance with our clients' requirements has made us very successful. Our licensed professional structural engineers prepare thorough, detailed, and clear stamped structural engineering drawings to suit your needs while also adhering to design requirements of the Town of Whitby and submit to the Town of Whitby for review and approval to obtain site plan approvals and building permits.

### **BUILDING EXPERTS CANADA**

Professional Engineers Ontario

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